

REPORT

on

**CHARACTERIZATION OF
UNTREATED AND TREATED HUNTERS POINT SANDBLASTING GRIT:
RESULTS OF THE SUPPLEMENTAL SAMPLING AND ANALYSIS PROGRAM
OF SEPTEMBER, 1990**

January, 1991

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SUPPLEMENTAL SAMPLING AND ANALYSIS PROGRAM
OF SEPTEMBER 1990

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TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION	1
2.0 SAMPLING PROGRAM AND STATISTICAL DESIGN	4
2.1 Sampling Design	4
2.1.1 Untreated Grit Pile	4
2.1.2 Treated Grit Pile	6
2.2 Statistical Design for the Grit Sampling	6
3.0 CHEMICAL ANALYSIS OF SAMPLES	7
4.0 DATA EVALUATION AND CONCLUSIONS	8
4.1 Metal Concentrations: Untreated Grit	8
4.2 Metal Concentrations: Treated Grit	8
4.3 Organic Constituent Concentration Data	9

LIST OF APPENDICES

APPENDIX A: SAMPLING AND ANALYSIS PLAN

APPENDIX B: ANALYTICAL DATA REPORTS

LIST OF TABLES

TABLE 1. BACKGROUND INFORMATION ON SAMPLES FROM THE UNTREATED GRIT PILE	12
TABLE 2. BACKGROUND INFORMATION ON SAMPLES FROM THE TREATED GRIT PILE	13
TABLE 3. TOTAL AND SOLUBLE METAL CONCENTRATION REGULATORY THRESHOLDS	15
TABLE 4. CHEMICAL DATA ON UNTREATED GRIT SAMPLES	16
TABLE 5. CHEMICAL DATA ON TREATED GRIT SAMPLES	18
TABLE 6. TTLC AND STLC COPPER AND LEAD DATA ON TREATED GRIT SAMPLES	20

TABLE OF CONTENTS
(Continued)

	<u>Page</u>
TABLE 7. ORGANIC PRIORITY POLLUTANT DATA FOR SAMPLE HP 144 (UTREATED GRIT)	21
TABLE 8. ORGANIC PRIORITY POLLUTANT DATA FOR SAMPLE HP 241 (TREATED GRIT)	22
TABLE 9. RESULTS OF ORGANO-TIN ANALYSES (UNTREATED GRIT)	23

LIST OF FIGURES

FIGURE 1. LAYOUT OF THE HUNTERS POINT SITE	5
FIGURE 2. GRAPHICAL REPRESENTATION OF STLC DATA FROM TREATED GRIT PILE AS A FUNCTION OF SAMPLE DEPTH	10

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1.0 INTRODUCTION

From 1976 to 1986, the Navy leased most of Naval Station, Treasure Island, Hunters Point Annex (HPA) to Triple A Machine Shop, which operated it as a commercial ship repair facility. Triple A's shipyard corrosion control operations generated spent sandblasting grit, which was deposited on the Industrial Landfill area of the shipyard. An accumulation of approximately 3,200 cubic yards of untreated and treated sandblasting grit present at the facility is the subject of this study. Preliminary analyses have shown that the material contains elevated levels of California Waste Extraction Test (WET) lead (Pb) and copper (Cu), making the grit a hazardous waste according to California state code.

Sandblasting grit is present in two different piles. One pile consists of about 2,400 cubic yards of untreated grit. The other pile contains approximately 800 cubic yards of treated grit resulting from the application of a sulfide-based stabilization formulation during a field demonstration conducted by ToxCo Inc., in December 1989. During the field demonstration, approximately 600 cubic yards of sandblasting grit were treated with a chemical stabilization formulation consisting of sodium hydrosulfide, fly ash (chemically analyzed and shown to be nonhazardous), and water. The

addition of these constituents to the 600 cubic yards of grit resulted in approximately 800 cubic yards of treated grit. Chemical analysis of several treated grab samples shows that, while some degree of fixation of the Pb and Cu has occurred, the treated grit is still hazardous by state code. That is, WET Pb and/or Cu exceed their respective Soluble Threshold Limit Concentrations (STLCs). All of the data from this project up through and including the field demonstration are summarized in the report entitled, "The Chemical Stabilization of Metal-Contaminated Sandblasting Grit at Naval Station, Treasure Island, Hunters Point Annex: A Summary of Waste Characterization, Benchscale Treatability, and Pilot-Scale Treatability Data", dated January, 1991.

Subsequent to this field demonstration, the California Department of Health Service's Alternative Technology Section (DOHS-ATS) in Sacramento has been in the process of promulgating policy that may permit the HPA sandblasting grit, both untreated as well as treated, to be recycled into asphaltic concrete or some other composite, instead of being treated and disposed of in a municipal landfill.

The purpose of this report is to summarize the sampling and analysis data of the sandblasting grit to characterize the 800 cubic yards of treated grit and to support the option to recycle the untreated and treated grit into asphalt. The untreated grit was extensively chemically characterized during a statistically randomized sampling and analysis effort that was conducted in late 1988-early 1989. These analyses included total California Assessment Manual (CAM) metals, WET-extractable metals for all metals having the potential of exceeding their STLCs based on the total metal analyses, selected Extraction Procedure (EP) metals, and baseline pH and reactive sulfide contents. The metal content of the grit does not exceed any Total Threshold Limit Concentrations (TTLCs), as designated in California Administrative Title 22, and also the grit passes the EP test for all 8 EP metals. However, STLC exceedances were observed for Cu and Pb, hence leading to the designation of this grit as "California-only" hazardous waste. Some additional confirmatory metal analyses were also conducted on the untreated grit and reported in this document. Also, selected grit samples were analyzed for organic priority pollutants and organo-tin compounds.

This report discusses the following:

- Sampling program, including sampling procedures, locations and numbers of samples, and analytical requirements
- Chemical analysis plans including the types and numbers of analyses to be conducted
- The statistical design of the sampling program
- The results of the chemical analysis of the untreated and treated grit.
- Implications of the chemical characterization data, in terms of hazardous waste classification and suitability of the grit for use in making asphaltic concrete.

2.0 SAMPLING PROGRAM AND STATISTICAL DESIGN

2.1 Sampling Design

A detailed Sampling and Analysis Plan was prepared for this activity and is included in Appendix A, along with comments from regulator agencies and comment resolution. The Sampling and Analysis Plan addresses issues such as sampling design, sampling and analysis methods, chain-of-custody, quality assurance/quality control, and health and safety.

2.1.1 Untreated Grit Pile

The field site (Figure 1) consists of two accumulated piles of sandblasting grit material situated on a cleared soil area. The larger pile is essentially rectangular to trapezoidal in shape having dimensions of approximately 20 yards wide by 35 yards long. The pile is about 10 feet high with a relatively flat top. As indicated in Section 1.0, the untreated sandblasting grit has been extensively chemically characterized in the earlier study. However, six additional samples from this pile were collected and analyzed for TCLP, TTLC, and STLC data for use in the bench-scale treatability demonstration of an asphalt technology.

As part of the original characterization, the untreated grit pile was schematically divided into a grid with equal surface areas by marking coordinates every 2 yards parallel to the sides of the pile. The approximate number of grids remaining after the December 1989 demonstration was 152. These remaining grids were also used for the statistical design of this sampling event.

Six different samples were collected along with one blind replicate. Three different samples were collected at each of two different depth intervals: (a) 0-5 feet, avoiding the top 3 inches; and (b) 5 feet to the bottom of the pile. A random number table was used to select the grids for each of these six different samples.

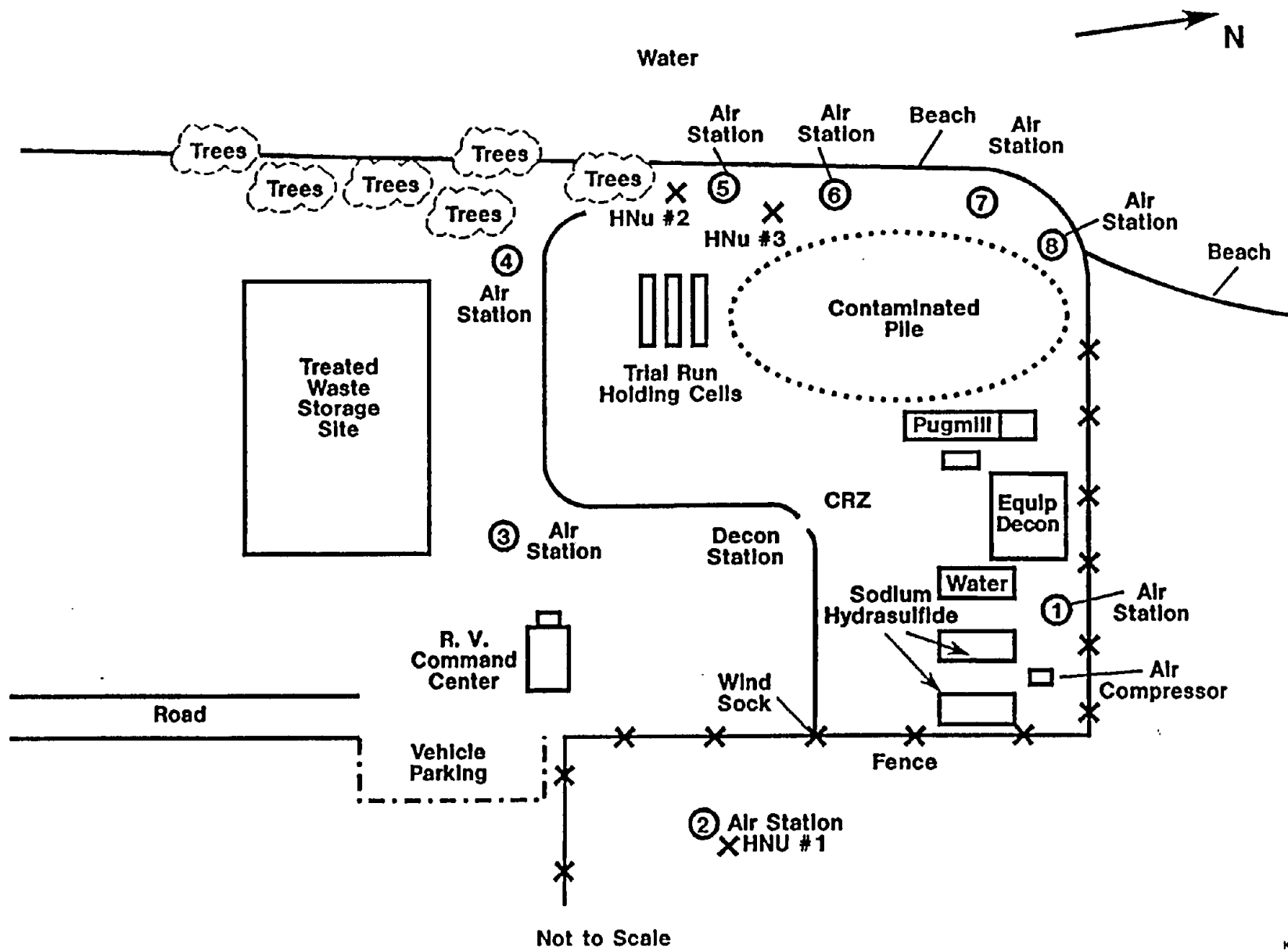


FIGURE 1. LAYOUT OF THE HUNTERS POINT SITE

2.1.2 Treated Grit Pile

The treated grit pile is located just east of the untreated pile, stored on a plastic ground liner, and covered with plastic to protect it against the weather. The pile is approximately 25 yards long by 15 yards wide and 2-4 feet deep. As indicated above, this pile contains sandblasting grit that was treated with aqueous sodium hydrosulfide, fly ash, and water.

Samples were collected at varying depth as well as horizontal locations. The sampling design for the treated material was a random grid design at two depths. Information on the variability of sample composition is necessary to ensure that the sampling reflects the actual composition of the entire 800 cubic yards of treated grit as closely as possible. Sixteen treated grit samples were collected.

2.2 Statistical Design for the Grit Sampling

The grit in the untreated pile is approximately 10 feet deep. The vertical strata were defined as two different depths: (1) 0-5 feet in depth, excluding the top 3 inches, and (2) 5 to approximately 10 feet in depth.

The untreated grit pile was subdivided into 6-foot x 6-foot grids. Stratified random sampling was used to select three grids for the 0-5 foot depths and three others for the 5-10 foot depths. Within each of these grids, approximately three to five subsamples were taken and mixed thoroughly to obtain a composite sample. Grid size was selected based upon the area required to collect the samples and a "rule of thumb" specifying that for sample size n , there should be $20 \times n$ grids.

Stratified random sampling was also used to select 16 sampling locations from the treated grit pile. Samples were collected at a depth of 0-1 feet from the top (avoiding the top 3 inches) and 0-1 feet from the bottom of the pile, avoiding the bottom 3 inches. Additional details on sampling design and sampling procedures are provided in the Draft Sampling and Analysis Plan in Appendix A.

3.0 CHEMICAL ANALYSIS OF SAMPLES

All of the data collected during this phase of the project are compiled in the form of data report sheets from the analytical laboratories in Appendix B and are presented in Tables 4 through 9. Tables 1 and 2 indicate sample depth and analytes. Table 3 lists the total and soluble metal thresholds for characteristic hazardous waste classification. A waste is considered EPA-hazardous by toxicity characteristic if any of the TCLP standards are exceeded and California-hazardous if any of the TTLC or STLC standards are exceeded.

Tables 4 and 5 summarize TTLC, STLC, and TCLP data on the untreated and treated grit samples, respectively. This includes TTLC and STLC data for the 17 California metals and Cr (VI) and TCLP data for all 8 RCRA metals. Also, the pH of the leachates is reported to determine the extent of leachate pH buffering by the waste. In addition to the multiple-metal scans reported in Tables 4 and 5, a larger number of treated samples were analyzed for TTLC and STLC Pb and Cu, the two target contaminants that exceed STLC thresholds (Table 6). Tables 4 through 6 also contain statistical summaries of the metal concentration data.

Selected grit samples were also analyzed for various organic contaminants. One sample each of treated and untreated grit was analyzed for organic priority pollutants, i.e., volatiles, semivolatiles, and PCB's/pesticides (Tables 7 and 8) and three archived untreated grit samples from the previous sampling program (November, 1988) were analyzed for organotin compounds (Table 9).

The results and implications of these chemical analyses reported in Tables 4 through 9 are discussed in Section 4.0 below.

4.0 DATA EVALUATION AND CONCLUSIONS

4.1 Metal Concentrations: Untreated Grit

Total and soluble metals concentration data on the untreated grit basically confirms the data collected previously in this program (November, 1988 sampling; see the report entitled "The Chemical Stabilization of Metal Contaminated Sandblasting Grit at Naval Station, Treasure Island, Hunters Point Annex", dated January 25, 1991). None of the metals exceed their TTLC limits and only Cu and Pb exceed their STLC limits (Table 4). Average STLC Cu concentration was 150 mg/L versus a threshold of 25 mg/L, and average STLC Pb concentration was 15.4 mg/L as compared to a threshold of 5 mg/L. These STLC Cu and Pb values compare well to average values of 144 mg/L and 19 mg/L recorded previously on this project (above referenced report, page 2-20). TCLP data show that the grit does not show EPA toxicity characteristic (Table 4). This is consistent with the EP Toxicity characteristic leaching data collected previously on this project.

4.2 Metal Concentrations: Treated Grit

Metal scan data on the treated waste are presented in Table 5 and show the same types of compositional trends as in the untreated waste (Table 4). Because Cu and Pb were shown to be the only two metals that exceeded California STLC thresholds, a larger number of treated samples were collected and analyzed for TTLC and STLC Cu and Pb. Table 6 shows the analytical data and includes a summary of the treatment effectiveness as measured by percent reduction of STLC metal concentration in the treated grit as compared to the untreated grit. The data show that STLC Cu and Pb were reduced somewhat by the sulfide/fly ash treatment, but not to below the Cu and Pb STLC threshold values. STLC Cu was reduced to approximately 55.5 mg/L with an average percent reduction of 43.1% (after subtracting out the effects of dilution by binder ingredients). STLC Pb was reduced to approximately 11.1 mg/L with an average percent reduction of 34.5%, again after the dilution correction (Table 6).

Further, the possible chemical stratification of the treated grit pile was examined by statistically analyzing the STLC Cu and Pb data in Table 6 based on the depth from which the samples were collected. A very pronounced depth-effect was observed for both STLC Cu and Pb (Figure 2). The more shallow samples (3 inches to 1 foot deep) contained significantly higher STLC Cu and Pb than the deeper samples (1 foot to 2 1/2 foot deep). In fact, the deeper samples comply with the STLC Cu threshold (21.3 mg/L versus threshold of 25 mg/L) and just slightly exceed the STLC Pb threshold (7.7 mg/L versus threshold of 5.0 mg/L). A probable explanation of this depth trend is that the dense sulfide setting agent was in contact with the deeper grit for a longer period of time than the grit at the top of the pile. It was observed during the field demonstration that the top of the treated grit dried out in a matter of a day or two, and that the sulfide setting agent collected near the base of the treated grit pile.

4.3 Organic Constituent Concentration Data

One untreated grit sample as well as one treated grit sample were collected and analyzed for EPA organic priority pollutant compounds, including semivolatiles, volatiles, and pesticides and PCB's. The untreated grit contains low concentrations (up to 2-3 mg/kg) of various polyaromatic hydrocarbons such as phenanthrene and pyrene (Table 7). These chemicals are probably incomplete combustion products from previous site activities. Two volatile compounds were also detected in the untreated grit in low concentrations, but these analyses are suspect because volatiles were also detected in the method blank.

The treated grit also contained various polyaromatic hydrocarbons in low mg/kg concentrations as well as 8.5 mg/kg of a phthalate plasticizer, which was also detected in the untreated grit in low concentration (Table 8). A number of volatile organic compounds were also apparently detected in the treated grit in concentrations up to several hundred parts per billion. Because organic solvent compounds were unlikely contaminants in either the grit or the chemicals that were used to treat the grit, and because traces of two of the solvents were detected in the method blank, we view this volatiles

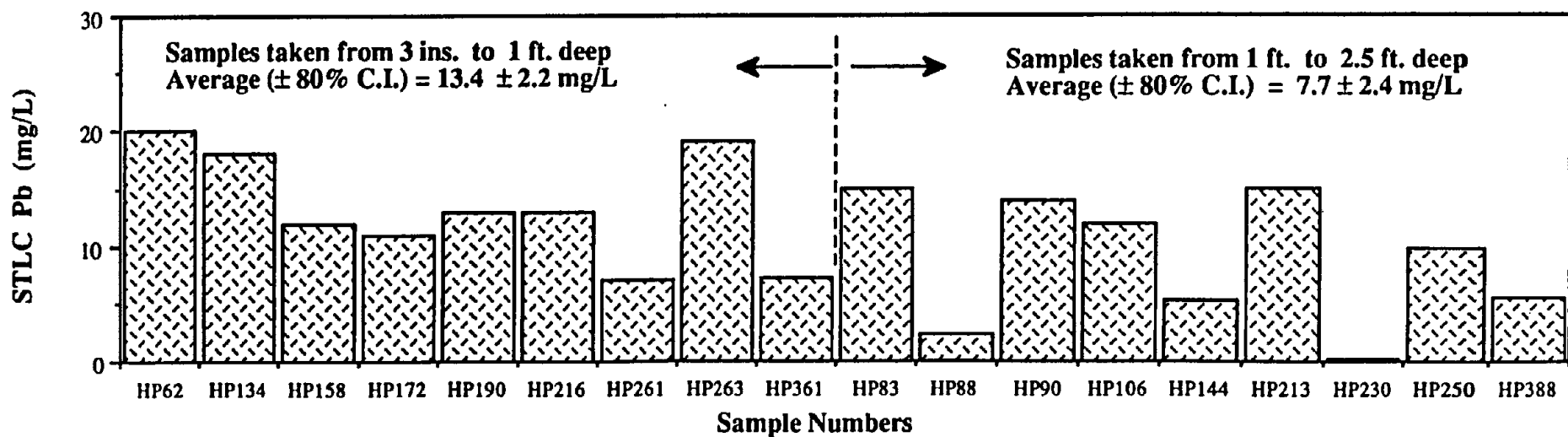
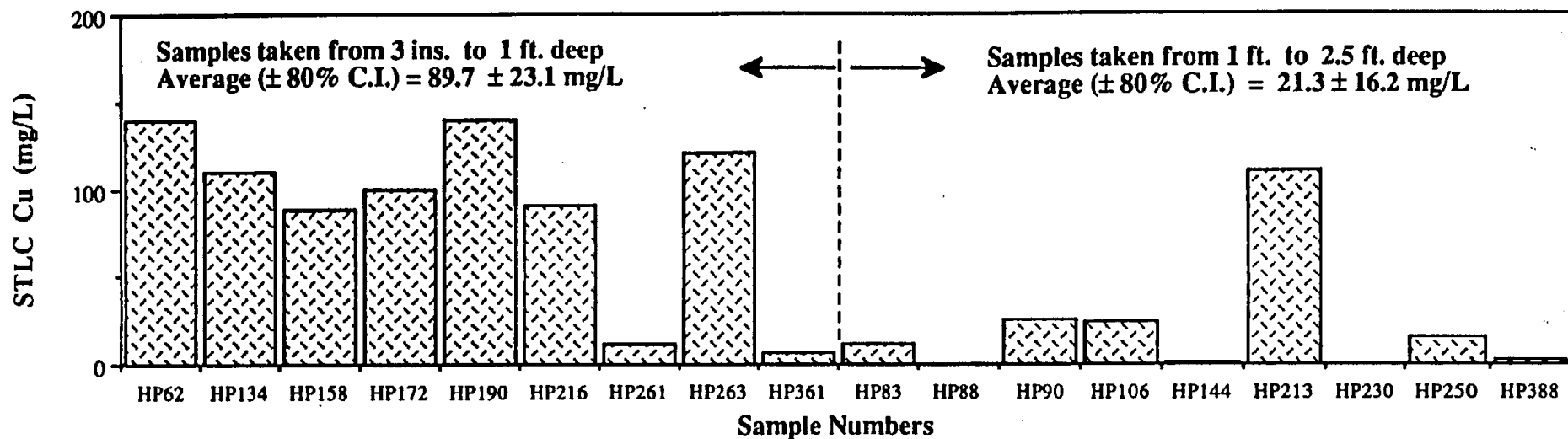


FIGURE 2. GRAPHICAL REPRESENTATION OF STLC DATA FROM TREATED GRIT PILE AS A FUNCTION OF SAMPLE DEPTH

analysis as questionable and intend to collect additional grit samples for volatiles analysis in the near future.

The apparent presence of two pesticides (Table 8) in the treated grit was also unexpected because the pesticides were absent in the untreated grit. These pesticide analyses will also be confirmed by additional analyses.

Finally, organo-tin analyses were conducted on three untreated grit samples from the November, 1988 sampling event. Trace concentrations of mono-, di-, and tri-butyl tin were detected in all of the grit samples (Table 9). The organo-tin compounds are likely from the antifouling formulations that were applied to the ship hulls and removed during sandblasting.

TABLE 1. BACKGROUND INFORMATION ON SAMPLES FROM THE UNTREATED GRIT PILE

Sample I.D.	Grid No.	Depth Interval	Analysis	Analytical Lab.	Notes
HP-144A	144	~12 inches	Volatiles (VOA)	ABB Environmental	--
HP-144B	144	~12 inches	Semivolatiles/ Pesticides/PCBs	ABB Environmental	--
HP-69B	69	3 in. - 5 ft.	(a) --	Battelle	Archive
HP-69C	69	3 in. - 5 ft.	(b)	ENSECO-CRL	--
HP-269C	69	3 in. - 5 ft.		ENSECO-CRL	Blind replicate
HP-29B	29	3 in. - 4.5 ft.	(b) --	Battelle	Archive
HP-29C	29	3 in. - 4.5 ft.		ENSECO-CRL	--
HP-62B	62	5 ft. - 6.5 ft.	(b) --	Battelle	Archive
HP-62C	62	5 ft. - 6.5 ft.		ENSECO-CRL	--
HP-26B	26	5 ft. - 8 ft.	(b) --	Battelle	Archive
HP-26C	26	5 ft. - 8 ft.		ENSECO-CRL	--
HP-133B	133	5 ft. - 8 ft.	(a) --	Battelle	Archive
HP-133C	133	5 ft. - 8 ft.		ENSECO-CRL	--
HP-51B	51	3 in. - 5 ft.	(a) --	Battelle	Archive
HP-51C	51	3 in. - 5 ft.		ENSECO-CRL	--
Sample 1	69, 29, 62, 26, 133, 51	3 in. - 2.5 ft.	For Asphalt Recycling Bench- Scale Treatability Test	Reed and Graham Environmental Sciences, Inc.	Composited Sample

(a) TCLP (8 metals), TTLC (17 metals), plus Chromium VI, STLC (17 metals) plus Chromium VI, pH of STLC, TCLP leachates after extraction.

(b) TCLP (8 metals), pH of TCLP leachate after extraction.

TABLE 2. BACKGROUND INFORMATION ON SAMPLES FROM THE TREATED GRIT PILE

Sample I.D.	Grid No.	Depth Interval	Analysis	Analytical Lab.	Notes
HP-241A	241	8 in. - 10 in.	Volatiles	ABB Environmetnal	--
HP-241B	241	8 in. - 10 in.	Semivolatiles/ Pesticide/PCB	ABB Environmental	--
HP-172B	172	3 in. - 1 ft.	(a) --	Battelle	Archive
HP-172C	172	3 in. - 1 ft.		ENSECO-CRL	--
HP-134	134	3 in. - 1 ft.	(a) --	Battelle	Archive
HP-134	134	3 in. - 1 ft.		ENSECO-CRL	--
HP-158B	158	3 in. - 1 ft.	(a) --	Battelle	Archive
HP-158C	158	3 in. - 1 ft.		ENSECO-CRL	--
HP-144B	144	18 in. - 27 ft.	(a) --	Battelle	Archive
HP-144C	144	18 in. - 27 ft.		ENSECO-CRL	--
HP-216B	216	3 in. - 1 ft.	(a) --	Battelle	Archive
HP-216C	216	3 in. - 1 ft.		ENSECO-CRL	--
HP-316C	216	3 in. - 1 ft.	(a) --	ENSECO-CRL	--
HP-230B	230	1 ft. - 2.5 ft.	(a) --	Battelle	Archive
HP-230C	230	1 ft. - 2.5 ft.		ENSECO-CRL	--
HP-261B	261	3 in. - 1 ft.	(a) --	Battelle	Archive
HP-261C	261	3 in. - 1 ft.		ENSCO-CRL	--
HP-190B	190	3 in. - 1 ft.	(a) --	Battelle	Archive
HP-190C	190	3 in. - 1 ft.		ENSECO-CRL	--
HP-263B	263	3 in. - 1 ft.	(b) --	Battelle	Archive
HP-263C	263	3 in. - 1 ft.		ENSECO-CRL	--
HP-62B	62	3 in. - 1 ft.	(b) --	Battelle	Archive
HP-62C	62	3 in. - 1 ft.		ENSECO-CRL	--

TABLE 2. BACKGROUND INFORMATION ON SAMPLES FROM THE TREATED GRIT PILE (Continued)

Sample I.D.	Grid No.	Depth Interval	Analysis	Analytical Lab.	Notes
HP-90B	90	1 ft. - 2.5 ft.	(a) --	Battelle ENSECO-CRL	Archive
HP-90C	90	1 ft. - 2.5 ft.			--
HP-88B	88	1 ft. - 2.5 ft.	(a) --	Battelle ENSECO-CRL	Archive
HP-88C	88	1 ft. - 2.5 ft.			--
HP-388C	88	1 ft. - 2.5 ft.	(a)	ENSECO-CRL	Replicate
HP-106B	106	1 ft. - 2.5 ft.	(b) --	Battelle ENSECO-CRL	Archive
HP-106B	106	1 ft. - 2.5 ft.			--
HP-83B	83	1 ft. - 2.5 ft.	(a) --	Battelle ENSECO-CRL	Archive
HP-83C	83	1 ft. - 2.5 ft.			--
HP-250B	250	1 ft. - 2.5 ft.	(a) --	Battelle ENSECO-CRL	Archive
HP-250C	250	1 ft. - 2.5 ft.			--
HP-213B	213	1 ft. - 2.5 ft.	(a) --	Battelle ENSECO-CRL	Archive
HP-213C	213	1 ft. - 2.5 ft.			--
Sample 2	172, 134, 158, 144, 216, 230, 261, 190, 263, 62, 90, 88, 106, 250, 213, 83	3 in. - 2.5 ft.	For Asphalt Recycling Bench- Scale Treatability Test	Reed and Graham Environmental Services, Inc.	Composited Samples

(a) TTLC (Pb and Cu), STLC (Pb and Cu), pH of leachates, reactive sulfide, spent solution pH, 1:1 pH.

(b) TTLC (17 metals) plus Chromium VI, STLC (17 metals) plus Chromium VI, pH of leachate after extraction, TCLP (8 metals), pH of leachate after extraction, 1:1 pH.

TABLE 3. TOTAL AND SOLUBLE METAL CONCENTRATION REGULATORY THRESHOLDS

Element	TTLC* mg/kg	STLC* mg/L	TCLP** mg/L
Cu	2500	25	--
Pb	1000	5	5
Sb	500	15	--
As	500	5	5
Ba	10,000	100	100
Be	75	0.75	--
Cd	100	1	1
Cr (Total)	2500	560	5
Cr (VI)	500	5	--
Co	8000	80	--
Hg	20	0.2	0.2
Mo	3500	350	--
Ni	2000	20	--
Se	100	1	1
Ag	500	5	5
Te	700	7	--
V	2400	24	--
Zn	5000	250	--

* From California administrative code, Title 22, Section 66699
 TTLC = total threshold limit concentration
 STLC = soluble threshold limit concentration using the California
 Waste Extraction Test (WET)

** Toxicity Characteristic Leaching Procedure (TCLP)
 Federal Register, Vol 55, No. 61, Thursday, March 29, 1990, p. 11804

TABLE 4. CHEMICAL DATA ON UNTREATED GRIT SAMPLES

Sample ID	Sample Depth	Cu	Pb	As	Ba	Be	Cd	Cr ¹	TTLT Metals (mg/kg)				Se	Ag	Te	V	Zn	Cr(VI)
									Co	Hg	Mo	Ni						
HP 51	1'-5'	2000	320	1.7	360	<0.6	1.0	85	14	<0.1	<10	94	<0.1	<1.0	<6.0	26	1400	6.6
HP 69	1'-5'	2000	330	1.1	150	<0.6	1.0	59	8	<0.1	<10	55	<0.1	<1.0	<6.0	<20	1400	3.9
HP 133	5'-8'	1500	110	0.8	440	<0.6	<1.0	29	6	<0.1	<10	18	<0.1	<1.0	<6.0	<20	1200	<1.0
Average		1800	250	1.2	320	<0.6	<1.0	58	9	<0.1	<0.1	56	<0.1	<1.0	<6.0	<22	1300	<3.8
Std. Dev.		300	120	0.5	150	-	-	28	4	-	-	38	-	-	-	<3	100	<2.8
80% UCL		2100	320	1.7	480	-	-	88	14	-	-	97	-	-	-	-	1400	-

Sample ID	Sample Depth	Cu	Pb	As	Ba	Be	Cd	Cr ¹	STLC Metals (mg/L)				Se	Ag	Te	V	Zn	Cr(VI)	pH of STLC Ext.
									Co	Hg	Mo	Ni							
HP 51	1'-5'	140	18	0.07	6.3	<0.03	0.06	2.5	<0.2	<0.01	<1.0	1.1	<0.01	<0.05	<0.3	<1.0	130	<1.0	5.2
HP 69	1'-5'	200	21	0.07	7.4	<0.03	0.06	2.2	<0.2	<0.01	<1.0	1.4	<0.01	<0.05	<0.3	<1.0	180	<1.0	5.2
HP 133	5'-8'	110	7.1	0.05	6.8	<0.03	<0.05	1.2	<0.2	<0.01	<1.0	0.5	<0.01	<0.05	<0.3	<1.0	190	<1.0	5.1
Mean		150	15.4	0.06	6.8	<0.03	<0.06	2.0	<0.2	<0.01	<1.0	1.0	<0.01	<0.05	<0.3	<1.0	170	<1.0	5.2
Std. Dev.		50	7.3	0.01	0.6	-	<0.01	0.7	-	-	-	0.5	-	-	-	-	30	-	0.1
80% UCL		200	23.4	0.07	7.4	-	-	2.7	-	-	-	1.5	-	-	-	-	240	-	5.2

TABLE 4. CHEMICAL DATA ON UNTREATED GRIT SAMPLES (Continued)

Sample ID	Sample Depth	Pb	As	Ba	Cd	Cr ¹	TCLP Metals (mg/L) Hg	Se	Ag	pH of TCLP Ext.
HP 26	5'-8'	1.0	Δ.5	Δ.5	Δ.05	Δ.5	Δ.02	Δ.05	Δ.5	5.2
HP 29	3'-4.5'	1.8	Δ.5	Δ.5	Δ.05	Δ.5	Δ.02	Δ.05	Δ.5	5.1
HP 51	1'-5'	1.1	Δ.5	Δ.5	Δ.05	Δ.5	Δ.02	Δ.05	Δ.5	5.0
HP 62	5'-6.5'	0.8	Δ.5	Δ.5	0.077	Δ.5	Δ.02	Δ.05	Δ.5	5.1
HP 69	1'-5'	1.4	Δ.5	Δ.5	Δ.05	Δ.5	Δ.02	Δ.05	Δ.5	5.0
HP 133	5'-8'	0.57	Δ.5	Δ.5	Δ.05	Δ.5	Δ.02	Δ.05	Δ.5	5.0
² HP 269	1'-5'	1.1	Δ.5	Δ.5	Δ.05	Δ.5	Δ.02	Δ.05	Δ.5	5.1
Average		1.11	Δ.5	Δ.5	Δ.05	Δ.5	Δ.02	Δ.05	Δ.05	5.1
Std. Dev.		0.40	-	-	Δ.01	-	-	-	-	0.1
80% UCL		1.33	-	-	-	-	-	-	-	5.1

¹ Total Chromium² HP 269 is a blind replicate of HP 69.

TABLE 5. CHEMICAL DATA ON TREATED GRIT SAMPLES

Sample ID	Sample Depth	Cu	Pb	Sb	As	Ba	Be	Cd	Cr ¹	Co	TTLC Metals (mg/kg)			Se	Ag	Te	V	Zn	Cr(VI)
											Hg	Mo	Ni						
HP 62	3"-1'	1400	200	<20	1.7	240	<0.6	1.0	40	10	<0.1	<10	62	<0.1	<1.0	<6.0	<20	1200	<1.0
HP 106	1'-2.5'	1100	160	<20	1.6	150	<0.6	<1.0	37	10	<0.1	<10	72	<0.1	<1.0	<6.0	24	800	<1.0
HP 263	3"-1'	1400	150	<20	1.2	100	<0.6	<1.0	25	6	<0.1	<10	29	0.1	<1.0	<6.0	<20	880	<1.0
Average		1300	170	<20	1.5	160	<0.6	<1.0	34	9	<0.1	<10	54	<0.1	<1.0	<6.0	<21.3	960	<1.0
Std. Dev.		200	30	-	0.3	70	-	-	8	2	-	-	23	-	-	-	<2.3	210	-
80% UCL		1500	200	-	1.8	230	-	-	42	11	-	-	79	-	-	-	-	1190	-

Sample ID	Sample Depth	Cu	Pb	Sb	As	Ba	Be	Cd	Cr ¹	Co	STLC Metals (mg/kg)			Se	Ag	Te	V	Zn	Cr(VI)	pH of STLC Ext.
											Hg	Mo	Ni							
HP 62	3"-1'	140	20	<1.0	0.2	1.3	<0.03	0.06	1.8	0.2	<0.01	<1.0	1.2	<0.005	<0.05	<0.3	<1.0	120	<1.0	5.5
HP 106	1'-2.5'	24	12	<1.0	0.05	4.5	<0.03	<0.05	1.5	<0.2	<0.01	<1.0	1.5	0.015	<0.05	<0.3	<1.0	70	<1.0	6.4
HP 263	3"-1'	120	19	<1.0	0.08	1.0	<0.03	<0.05	1.0	<0.2	<0.01	<1.0	1.0	0.010	<0.05	<0.3	<1.0	78	<1.0	5.3
Average		95	17	<1.0	0.11	2.3	<0.03	<0.05	1.4	<0.2	<0.01	<1.0	1.2	<0.01	<0.05	<0.3	<1.0	89	<1.0	5.7
Std. Dev.		62	4	-	0.08	1.9	-	<0.06	0.4	-	-	-	0.3	<0.05	-	-	-	27	-	0.6
80% UCL		162	22	-	0.20	4.4	-	-	1.9	-	-	-	1.5	-	-	-	-	119	-	6.4

TABLE 5. CHEMICAL DATA ON TREATED GRIT SAMPLES (Continued)

Sample ID	Sample Depth	Pb	As	Ba	Cd	Cr ¹	TCLP Metals (mg/L) Hg	Se	Ag	TCLP Ext.
HP 62	3"-1'	<0.5	<0.5	<5	0.08	<0.5	<0.02	<0.05	<0.5	7.4
HP 106	1'-2.5'	<0.5	<0.5	<5	0.13	<0.5	<0.02	<0.05	<0.5	6.3
HP 263	3"-1'	<0.5	<0.5	<5	0.1	<0.5	<0.02	<0.05	<0.5	6.8
Average		<0.5	<0.5	<5	0.10	<0.5	<0.02	<0.05	<0.5	6.8
Std. Dev.		-	-	-	0.03	-	-	-	-	0.6
80% UCL		-	-	-	0.13	-	-	-	-	7.4

¹ Total Chromium

TABLE 6. TTLC AND STLC COPPER AND LEAD DATA ON TREATED GRIT SAMPLES

Sample ID	Sample Depth	Sample pH	TTLC Cu (mg/kg)	STLC Cu (mg/L)	TTLC Pb (mg/kg)	STLC Pb (mg/L)	Percent Reduction in STLC Concentration Without Dilution Correction ¹		Percent Reduction in STLC Concentration With Dilution Correction ^{1,2}		pH of STLC Extract	Reactive Sulfide (mg/kg)	pH of Reactive Sulfide Spent Solution
HP 62	3"-1'	12.2	1400	140	200	20	2.9	-	2.2	-	5.5		
HP 83	1'-2.5'	12.6	680	12	200	15	91.7	21.1	34.0	20.7	5.5		
HP 88	1'-2.5'	12.4	1000	0.31	150	2.4	99.8	87.4	54.5	64.2	5.9		
HP 90	1'-2.5'	11.9	1100	26	190	14	81.9	35.7	49.2	33.3	5.6	ND <50	2.2
HP 106	1'-2.5'	12.5	1100	24	160	12	83.3	36.8	50.0	28.9	6.4		
HP 134	3"-1'	11.1	1300	110	210	18	23.6	5.2	16.7	5.2	5.4	ND <50	6.6
HP 144	18"-27"	12.0	1600	1.1	160	5.2	99.2	72.6	86.7	56.9	5.6		
HP 158	3"-1'	10.4	1300	89	150	12	38.2	36.8	27.1	27.1	5.4	ND <50	<2
HP 172	3"-1'	10.9	1500	100	140	11	30.6	42.1	25.1	28.9	5.4		
HP 190	3"-1'	10.6	1600	140	150	13	2.9	31.6	2.5	23.2	5.3		
HP 213	1'-2.25'	10.8	1500	110	180	15	23.6	21.1	14.3	18.6	5.3	ND <50	<2
HP 216	3"-1'	11.0	1600	91	170	13	36.8	46.1	32.1	38.4	5.5	ND <50	6.7
HP 230	1'-2.5'	12.6	1600	ND <0.05	150	ND <0.2	99.9	98.9	87.2	72.7	5.9	ND <50	2.4
HP 250	1'-2.0'	11.7	1500	16	130	9.9	88.9	47.9	72.8	30.5	5.6	ND <50	2.0
HP 261	3"-1'	11.7	1300	11	120	7.1	92.4	62.6	65.6	36.8	5.6	ND <50	4.5
HP 263	3"-1'	10.2	1400	120	150	19	16.7	0	12.8	0	5.3		
*HP 361	3"-1'	11.6	1400	6.8	150	7.3	95.3	61.6	72.8	45.3	5.6	ND <50	4.0
**HP 388	1'-2.5'	12.4	1200	2.0	160	5.5	98.6	71.1	64.6	55.7	5.8		
Average		11.6	1300	55.5	160	11.1	61.5	45.8	43.1	34.5	5.6	<50	<3.4
Std. Dev.		0.8	200	54.4	20	5.6	37.8	27.3	27.7	19.7	0.3	-	<2.3
80% UCL		11.8	1400	72.6	170	12.8	73.3	54.9	51.8	41.1	5.7	-	-

¹ Average untreated grit metal concentrations used in the calculations are: TTLC (mg/kg):

Pb - 204, Cu - 1832; STLC (mg/L): Pb - 19, Cu - 144.

² Corrected for dilution effects using total metal concentration data.

ND = None Detected

*HP 361 is a blind replicate of HP 261

**HP 388 is a blind replicate of HP 88

TABLE 7. ORGANIC PRIORITY POLLUTANT DATA FOR SAMPLE HP 144 (UNTREATED GRIT)

Category	Analyte*	Method	Method Blank	Results (µg/kg)	Detection Limit
Semivolatiles	Napthalene	EPA 8270	ND	68	67
	Acenaphthene		ND	200	67
	Fluorene		ND	230	67
	Phenanthrene		ND	2,100	67
	Anthracene		ND	540	67
	Fluoranthene		ND	2,500	67
	Pyrene		ND	2,100	67
	Benzo(a)anthracene		ND	810	67
	bis (2-ethylhexyl phthalate		ND	810	67
	Chrysene		ND	910	67
	Benzo(k)fluoranthene		ND	2,200	67
	Benzo(a)pyrene		ND	950	67
Volatiles	Methylene Chloride	EPA 8240	3.1	14	2
	Acetone		4.6	20	2
Organochlorine	--		--	--	--
Pesticides and PCBs	--		--	--	--

* Table reports analyte above detection limit (see Appendix B for complete list of analytes analyzed)

TABLE 8. ORGANIC PRIORITY POLLUTANT DATA FOR SAMPLE HP 241 (TREATED GRIT)

Category	Analyte*	Method	Method Blank	Results (µg/kg)	Detection Limit
Semivolatile	Phenol	EPA 8270	ND	1,900	330
	Acenaphthene		ND	190	67
	Fluorene		ND	200	67
	Phenanthrene		ND	2,200	67
	Anthracene		ND	470	67
	Fluoranthene		ND	2,700	67
	Pyrene		ND	2,300	67
	Benzo(a)anthracene		ND	1,100	67
	Bis(2-ethylhexyl) phthalate		ND	8,500	67
	Chrysene		ND	1,400	67
	Benzo(k)fluoranthene		ND	2,900	67
	Benzo(a)pyrene		ND	1,200	67
Volatiles	Methylene Chloride	EPA 8240	3.1	39	2
	Acetone		4.6	410	2
	2-Butanone		ND	69	10
	Trichloroethene		ND	5.6	2.0
	2-Hexanone		ND	2.5	2.0
	Toluene		ND	7.9	2.0
	Ethylbenzene		ND	4.1	2.0
	Xylene (Total)		ND	32	2.0
	1, 2-Dichlorobenzene		ND	2.8	2.0
Organochlorine	Arochor 1254		ND	1,200	160
Pesticides and PCB's	Arochor 1260		ND	710	160

* Table reports analyte above detection limit (see Appendix B for complete list of analytes analyzed).

TABLE 9. RESULTS OF ORGANO-TIN ANALYSES (UNTREATED GRIT)

Sample Number	Dry/Wet Ratio	Butyltin Chloride Concentrations ($\mu\text{g/g}$ dry weight)		
		mono-	di-	tri-
Subset I				
HP-11	0.99	22	14	47
HP-14	0.99	25	16	54
HP-20	0.99	28	18	56
Subset II				
HP-11	0.99	17	26	79
HP-14	0.99	20	14	26
HP-20	0.99	18	14	280
Subset III				
HP-11	0.99	24	11	22
HP-14	0.99	24	11	26
HP-20	0.99	24	11	46

APPENDIX A
SAMPLING AND ANALYSIS PLAN

DRAFT
WORK PLAN

for

SAMPLING AND ANALYSIS OF
UNTREATED AND TREATED SANDBLASTING GRIT

at

NAVAL STATION, TREASURE ISLAND,
HUNTERS POINT ANNEX

June 28, 1990

by

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TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION	1
2.0 SAMPLING PROGRAM	4
2.1 Sampling Design	4
2.1.1 Untreated Grit Pile	4
2.1.2 Treated Grit Pile	4
2.2 Sample Collection Methods	6
2.3 Sample Handling, Storage, and Blanks	7
2.4 Sample Labeling and Record Keeping	7
2.5 Sample Analysis	8
3.0 STATISTICAL DESIGN	9
3.1 Statistical Design for the Grit Sampling	10
3.1.1 Overview	10
3.1.2 Approach	10
3.1.2.1 Stratified Random Sample	10
3.1.2.2 Number of Samples Per Stratum	11
3.1.2.3 Grid Size	11
3.1.2.4 Selection of Grids	12
3.1.2.5 Sampling Method Within A Grid	12
3.1.2.6 Statistical Estimators	12
4.0 QUALITY ASSURANCE/QUALITY CONTROL PLAN	12
5.0 HEALTH AND SAFETY PLAN	14
5.1 Job Hazard Analysis	14
5.1.1 Primary Health Hazards	14
5.1.2 Potential Safety Hazards at Site	17
5.1.3 Anticipated Weather Conditions	18
5.1.4 Key Personnel and Responsibilities	18
5.2 Risk Assessment Summary	18
5.3 Personal Protective Equipment	19
5.4 Work Practices	20
5.5 Decontamination	20
5.6 Emergency Plans	20

Comments on Draft Sampling and Analysis Plan and Responses

Attachments

A - Analytical Methods

B - map to Hospital

TABLE OF CONTENTS
(Continued)

Page

LIST OF TABLES

TABLE 1.	ANALYTICAL INFORMATION FOR UNTREATED GRIT	9
TABLE 2.	ANALYTICAL INFORMATION FOR PARTIALLY TREATED GRIT	9
TABLE 3.	PRIMARY HEALTH HAZARDS AND EXPOSURE LIMITS CHEMICAL SUBSTANCES DETECTED ON SUBJECT SITE	15
TABLE 4.	EXPOSURE TO CONTAMINANTS WITH 5 MG/M ³ TOTAL EXPOSURE	16

LIST OF FIGURES

FIGURE 1.	SCHEMATIC OF THE UNTREATED GRIT PILE	5
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DRAFT
WORK PLAN

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SAMPLING AND ANALYSIS OF
UNTREATED AND TREATED SANDBLASTING GRIT

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NAVAL STATION, TREASURE ISLAND,
HUNTERS POINT ANNEX

June 27, 1990

by

BATTELLE
Columbus, Ohio

1.0 INTRODUCTION

From 1976 to 1986, the Navy leased most of Naval Station, Treasure Island, Hunters Point Annex (HPA) to Triple A Machine Shop, which operated it as a commercial ship repair facility. Triple A's shipyard corrosion control operations generated spent sandblasting grit, which was deposited on the Industrial Landfill area of the shipyard. An accumulation of approximately 3,200 cubic yards of untreated and treated sandblasting grit present at the facility is the subject of this study. Preliminary analyses have shown that the material contains elevated levels of California Waste Extraction Test (WET) lead (Pb) and copper (Cu), making the grit a hazardous waste according to California state code.

Sandblasting grit is present in two different piles. One pile consists of about 2,400 cubic yards of untreated grit. The other pile contains approximately 800 cubic yards of treated grit resulting from the application of a sulfide-based stabilization formulation during a field demonstration conducted by ToxCo Inc., in December 1989. During the field

demonstration, approximately 600 cubic yards of sandblasting grit were treated with a chemical stabilization formulation consisting of sodium hydrosulfide, fly ash (chemically analyzed and shown to be nonhazardous), and water. The addition of these constituents to the 600 cubic yards of grit resulted in approximately 800 cubic yards of treated grit. Chemical analysis of several treated grab samples shows that, while some degree of fixation of the Pb and Cu has occurred, the treated grit is still hazardous by state code. That is, WET Pb and/or Cu exceed their respective Soluble Threshold Limit Concentrations (STLCs). The upper parts of the treated grit pile contain higher levels of WET Pb and Cu than the lower parts, where the degree of stabilization appears to be greater.

Subsequent to this field demonstration, it has come to our attention that the California Department of Health Service's Alternative Technology Section (DOHS-ATS) in Sacramento is in the process of promulgating policy that may permit the HPA sandblasting grit, both untreated as well as treated, to be recycled into asphalt or some other composite, instead of being treated and disposed of in a municipal landfill.

The purpose of this Work Plan is to outline the procedures to be followed in the sampling and analysis of the sandblasting grit to characterize the 800 cubic yards of treated grit and to support the option to recycle the untreated and treated grit into asphalt. The untreated grit was extensively chemically characterized during a statistically randomized sampling and analysis effort that was conducted in late 1988-early 1989. These analyses included total California Assessment Manual (CAM) metals, WET-extractable metals for all metals having the potential of exceeding their STLCs based on the total metal analyses, selected Extraction Procedure (EP) metals, and baseline pH and reactive sulfide contents. The results of these analyses are summarized in the "Work Plan for Field Treatment Demonstration and Removal of Metal-Contaminated Sandblasting Grit", dated October 13, 1989, and are presented in detail in an Interim Status Report for this project that is in preparation. The metal content of the grit does not exceed any Total Threshold Limit Concentrations (TTLCs), as designated in California Administrative Title 22, and also the grit passes the EP test for all 8 EP

metals. However, STLC exceedances were observed for Cu and Pb, hence leading to the designation of this grit as "California-only" hazardous waste.

Baseline data are needed on the chemical characteristics of the treated grit. The primary objective of this Work Plan is to define the procedures for the statistically randomized sampling of the treated grit pile. At the same time, we will collect samples of the untreated grit for bench-scale testing to demonstrate the feasibility of the proposed asphaltting process. A Work Plan for the bench-scale testing is being prepared. Selected samples of the untreated sandblasting grit will also be analyzed using the U.S. Environmental Protection Agency (EPA) Toxicity Characteristic Leaching Procedure (TCLP) leaching methodology, which in the near future will replace the EP test for Resource Conservation and Recovery Act (RCRA) toxicity characteristic-based waste hazard classification.

This Work Plan discusses the following:

- Sampling program, including sampling procedures, locations and numbers of samples, and analytical requirements (Section 2.0)
- Chemical analysis plans including the types and numbers of analyses to be conducted (Section 2.0)
- The statistical design of the sampling program (Section 3.0)
- Quality assurance/quality control measures for both sampling and analysis, including documentation, record keeping and internal quality control checks (Section 4.0)
- Health and safety considerations relating to the sampling, including a discussion of the primary health hazards, proposed control measures and work practices, key sampling personnel, and plans in the event of an emergency (Section 5.0).

2.0 SAMPLING PROGRAM

2.1 Sampling Design

2.1.1 Untreated Grit Pile

The field site consists of two accumulated piles of sandblasting grit material situated on a cleared soil area. The larger pile is essentially rectangular to trapezoidal in shape having dimensions of approximately 20 yards wide by 35 yards long (Figure 1). The pile is about 10 feet high with a relatively flat top. As indicated in Section 1.0, the untreated sandblasting grit has been extensively chemically characterized in an earlier study. However, six additional samples from this pile will be collected and analyzed for TCLP metals and for use in the bench-scale treatability demonstration of an asphalt technology.

As part of the original characterization, the untreated grit pile was schematically divided into a grid with equal surface areas by marking coordinates every 2 yards parallel to the sides of the pile (See Figure 1). The approximate number of grids remaining after the December 1989 demonstration is 152. For this sampling, we will use the same grids.

Six different samples will be collected along with one blind replicate. Three different samples will be collected at each of two different depth intervals: (a) 0-5 feet, avoiding the top 3 inches; and (b) 5-10 feet. The random number table will be used to select the grids for each of these six different samples.

2.1.2 Treated Grit Pile

The second grit pile is located just east of the untreated pile, stored on a plastic ground liner, and covered with plastic to protect it against the weather. As indicated above, this pile contains sandblasting grit that was treated with aqueous sodium hydrosulfide, fly ash, and water.

Previous analysis of samples of the treated grit from a variety of depths suggests that the treated grit is stratified in chemical composition

FIGURE 1 – SCHEMATIC OF THE UNTREATED GRIT PILE
PAGE 5

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with the shallow material containing higher WET Pb and Cu contents than the deeper materials. Therefore, samples must be collected at varying vertical as well as horizontal locations. The sampling design for the treated material will be a random grid design at two depths. Information on the variability of sample composition is necessary to ensure that the sampling reflects the actual composition of the entire 800 cubic yards of grit as closely as possible.

The treated pile is approximately 24 yards wide by 24 yards long and is about 2.5 feet high with a relatively flat top. The treated grit pile will be consolidated somewhat in the near future by a contractor who will then cover the grit pile with a secure tarpaulin. Our sampling must precede tarpaulin installation, otherwise the tarpaulin contractor will need to be present to remove the tarpaulin temporarily and then recover the pile after sampling. We have assumed for statistical design purposes that the treated pile will be sampled prior to consolidation and tarpaulin installation. The pile will be divided schematically into a grid pattern having equal rectangles with 6 foot x 4 foot sides. This will result in approximately 216 grids each having a surface area of 24 square feet. The grid areas will be numbered consecutively so that sample locations can be referenced. Then sample grid numbers will be selected for each of the sampling locations from a random number table.

Sixteen different samples will be collected along with two blind replicates. Eight different samples will be collected at each of two different depth intervals: (a) 0-1 feet from the top, avoiding the top 3 inches, and (b) 0-1 feet from the bottom, avoiding the bottom 3 inches. As indicated above, a random number table will be used to select the grids for each of the 18 samples. Additional details on the statistical design of the sampling program are provided in Section 3.0.

2.2 Sample Collection Methods

Samples will be collected within each randomly selected grid by first locating a sampling point in a corner or center of that grid. Each sample will be collected by means of either a stainless steel sand auger or a

stainless steel shovel to the depths indicated in the sampling design. Special attention will be paid to prevent the puncture of the plastic ground liner underlying the treated grit pile. However, the impact of a puncture, should it occur, should be negligible because the grit pile will be covered with a secure tarpaulin soon after sampling. The sample will be placed in a clean disposable polyethylene tray or stainless steel pan. Any large pieces of debris or stones will be removed and discarded. Additional samples will be collected within the same grid and then composited in the tray and mixed using a stainless steel or plastic serving spoon. Each composite sample will be placed in EPA-approved, precleaned polyethylene bottles to yield three split samples as follows:

- Sample "A" - 2000 cc, for bench-scale treatability testing
- Sample "B" - 500 cc, for archival
- Sample "C" - 250 cc, for chemical analysis.

2.3 Sample Handling, Storage, and Blanks

All sample bottles will be precleaned polyethylene bottles with screw-type lids. The sampling devices and mixing tray will be cleaned between each different composite sample using Kimwipe-type tissues or paper towels. Damp wipe cleaning of the sampling device(s) will occur at the end of each day and at the conclusion of sampling. Any remaining unused sample material will be discarded on the surface of the grit pile in an area not used for sampling.

All equipment except the power auger will be either stainless steel, polyethylene, or teflon-lined. Samples will be stored in ice chest-type coolers both during storage at the site and during shipment.

2.4 Sample Labeling and Record Keeping

Each bottle will be labeled with a unique number coded to the grid location followed by a letter code from A to C. A description of the sample will be entered in the permanent laboratory record book and on each bottle

label. The information to be recorded in the laboratory notebook shall include the following:

- Sample number
- Grid location (matrix number)
- Sample date and time (day/month/year, hour)
- Observations (moisture, color, unusual odors)
- Collection method
- Sampler name(s).

All sample bottles will be placed in polyethylene bags and then securely sealed after label information and sample identification are checked and entered on standard chain-of-custody forms. Each laboratory receiving samples will receive a separate custody form and shipping inventory. Samples will be designated for use as follows:

- Sample A Composite (one each for treated and untreated grit) to R&G Environmental Services, Inc., of San Jose, California, for bench-scale treatability testing
- Sample B to Battelle in Columbus, Ohio, for archive
- Sample C to an appropriately certified analytical laboratory.

2.5 Sample Analysis

The following tables list the analytical methods and approximate numbers of samples to be analyzed:

TABLE 1. ANALYTICAL INFORMATION FOR UNTREATED GRIT

Type of Analysis	Number of Samples
TCLPs, all 8 metals	7 (includes 1 blind rep.)
TTLCs, all 17 metals plus hexavalent chromium	3
STLCs, all 17 metals plus hexavalent chromium	3

TABLE 2. ANALYTICAL INFORMATION FOR TREATED GRIT

Type of Analysis	Number of Samples
TTLCs, Pb and Cu	15 (includes 2 blind reps.)
STLCs, Pb and Cu	15 (includes 2 blind reps.)
TTLCs, all 17 metals plus hexavalent chromium	3
STLCs, all 17 metals plus hexavalent chromium	3
TCLPs, all 8 metals	3
Reactive Sulfide	9 (includes 1 blind rep.)
pH	18 (includes 2 blind reps.)

3.0 STATISTICAL DESIGN

Sampling and analysis must be responsive to both regulatory requirements and scientific objectives. In report SW-846 entitled, "Test Methods for Evaluating Solid Waste", the EPA has identified the important elements of a sampling plan for solid wastes and a statistical approach based on the scientific objectives. The statistical design for the present study will address relevant issues such as sampling accuracy and precision and stratified random sampling, as given in SW-846.

3.1 Statistical Design for the Grit Sampling

An overview of the sampling will be discussed first, followed by details on each aspect of the sampling design. The overview is intended to provide a general understanding of how the grit material will be sampled.

3.1.1 Overview

The grit in the untreated pile is approximately 10 feet deep. The vertical strata will be defined as two different depths: (1) 0-5 feet in depth, excluding the top 3 inches, and (2) 5-10 feet in depth.

The untreated grit pile has been subdivided into 6-foot x 6-foot grids. Random sampling will then be used to select three grids for the 0-5 foot depths and three others for the 5-10 foot depths. Within each of these grids, approximately three to five samples will be taken and mixed thoroughly to obtain a composite sample.

Random sampling will also be used to select 16 sampling locations from the treated grit pile. Samples will be collected at a depth of 0-1 feet from the top (avoiding the top 3 inches) and 0-1 feet from the bottom of the pile, avoiding the bottom 3 inches. This approach is preferable to obtaining samples strictly as a function of depth from the top of the pile, because the treated grit pile varies in depth. Within each of these randomly selected grids, three to five samples will be taken and composited.

3.1.2 Approach

3.1.2.1 Stratified Random Sample. Stratified random sampling is a sampling design that divides the population into units (strata) based on information about the population, then random samples are drawn from each stratum. Reduced variability within each stratum produces estimates with smaller variances than do estimators from a simple random sampling of the same area and sample size.

Vertical stratification of contaminant concentrations was expected in the untreated pile due to the potential for leaching and downward migration

of contaminants. Sampling and analysis of the untreated grit pile during the previous tests indicated no significant stratification of contaminants. Therefore, the untreated grit will be divided only into two strata rather than the three strata sampled earlier.

As indicated previously, there appears to be vertical chemical stratification in the treated grit pile based on grab samples. Because this pile is only several feet high, two strata (each 1 foot in thickness) will be used in the sampling program design.

The key elements that must be defined for this type of sampling design include the following: (1) the strata, (2) number of samples per stratum, (3) the grids (spatial area) to be sampled, (4) the selection of the grids, (5) the sampling method within a grid, and (6) the estimators used to characterize each stratum and the population.

3.1.2.2 Number of Samples Per Stratum. As indicated above, the untreated grit pile was sampled and analyzed previously. Because the untreated pile is already well characterized, no extensive sampling plan will be required. Preliminary analysis of Cu and Pb data indicates that the characteristics of grit with respect to these two elements are fairly uniform. Consequently, three random samples per stratum will be collected for chemical characterization.

The treated grit has not yet been characterized adequately. Therefore, eight locations per layer will be sampled. Because the height of the pile is only several feet and is irregular, the pile will be divided into two layers. Therefore, 16 different sample will be collected. The upper layer will consist of the top 12 inches excluding the top 3 inches; the lower layer will be the bottom 12 inches, excluding the bottom 3 inches.

3.1.2.3 Grid Size. The grid size selected was based upon the area required to collect the samples and a "rule of thumb" that for a sample of size n , there should be $20 \times n$ grids. Since a sample size of eight is proposed for the treated pile, the number of grids is 160. Consequently, a grid size of 6 feet x 4 feet is proposed for the pile with approximate dimensions of 72 feet x 72 feet. This will result in approximately 216 grids.

3.1.2.4 Selection of Grids. Selection of the grids per stratum will occur randomly. The grids will be numbered from 1 to approximately 216. The first eight numbers drawn from a random number table which correspond to a grid number will constitute the grids used to collect samples from the surface. These samples will be numbered 1-8. This random selection process will be repeated to choose another eight grids for the bottom samples, which will be numbered 9-16. Samples 17 and 18 will be blind replicates, one representing each depth.

3.1.2.5 Sampling Method Within A Grid. Spatial composite sampling will be used to characterize the grit within a grid. Approximately three to five samples will be taken within each grid from the corners of the grid and the center. These samples will then be composited via mixing in a lined container into a homogenous sample for the various analyses.

3.1.2.6 Statistical Estimators. Means, variances, and confidence intervals will be used to characterize the partially treated pile. First, the mean, variance, and confidence interval per stratum will be determined as given in SW-846. The statistical analysis will then be developed for the whole grit pile based on the stratified random sampling data.

4.0 QUALITY ASSURANCE/QUALITY CONTROL PLAN

The following items are the essential elements of QA/QC for this program:

Project Coordination. The study will be under the direction of Dr. Jeff Means of Battelle. Dr. Means, the Project Manager, will be responsible for daily activities and coordination throughout the sampling and analysis program. Dr. Means will also review all data and lab book entries. Dr. Means will convey any problems directly to the client Project Engineer, Mr. Jeffery C. Heath of the Naval Civil Engineering Laboratory, for corrective action as required.

Sampling Procedures. These are discussed in Section 2.0. Any variation or exceptions will be documented in laboratory record books.

Sample Custody. All sample inventories will be entered on standard chain-of-custody forms. All sample bottles will be secured with chain-of-custody tape between collection time and receipt at laboratories. Laboratories will follow standard chain-of-custody control of samples.

Calibration. Laboratory analytical calibration will be required according to each instrument's standard procedure and will include linear dynamic range calibrations.

Analytical Procedures. Methods referenced for analysis will be used as specified. Any deviations or variations will be documented.

Data Reduction and Reporting. All analytical data will be reduced by the laboratory conducting the analysis and reported to the Project Manager. Data should include the complete field sample number, any assigned laboratory numbers, any observations or problems, limits of detection for method of analysis, and concentration per mass of sample analyzed. Standard data forms or permanent record copies will be maintained for analytical traceability. The results of any spikes and replicates will also be included.

Internal Quality Control Checks. One blind replicate sample per approximately every eight samples are included to assess (1) the homogeneity of samples and (2) reproducibility of the analytical data.

Performance of System Audits. Audits are not anticipated for this program unless reported data are incomplete.

Preventive Maintenance. Field and laboratory equipment will be maintained in clean, workable condition.

Procedures to Assess Data. All field records will be reviewed by the Project Manager or his designee. Sample inventories, chain-of-custody forms, and sample labels will be checked by a second person prior to shipment. Data will be reviewed for completeness by the Project Manager.

Corrective Action. Any inadequacies or errors will be noted and communicated to the responsible person (i.e., person signing forms or records) for explanation as required. Any errors or corrections must be initialed and dated after a single line-through. No errors are to be corrected by tape erasing, white-out, or obliteration. All entries will be legible or corrected to legible.

5.0 HEALTH AND SAFETY PLAN

5.1 Job Hazard Analysis

5.1.1 Primary Health Hazards

The sandblasting grit contains a variety of metals in low concentrations, most importantly the following:

- Zinc up to 2,500 ppm
- Copper up to 2,500 ppm
- Barium up to 340 ppm
- Lead up to 330 ppm
- Nickel up to 270 ppm
- Total chromium up to 180 ppm
- Hexavalent chromium up to 14 ppm.

The most significant of these in terms of possible health affects are hexavalent chromium and lead. Also, the treated grit pile has elevated pH, up to 12-12½, due to the stabilization chemicals that were added and contains reactive sulfide in low ppm concentrations, which could be converted to H₂S (hydrogen sulfide) if exposed to a strong acid.

The primary potential health hazards associated with exposure to the chemical substances identified in detectable concentrations are provided in Table 3. Applicable employee 8-hour permissible exposure limits and threshold limit values (TLVs) are also indicated in Table 4 where available. The applicable permissible exposure limits (PELs) are defined by the United States Department of Labor, Occupational Safety and Health Administration (OSHA), in the volume identified in the Code of Federal Regulations (CFR), Title 29, Labor, Section 1910.1000, or other appropriate section.

The TLVs listed are recommended by the American Conference of Governmental Industrial Hygienists (ACGIH). TLVs refer to airborne

TABLE 3. PRIMARY HEALTH HAZARDS AND EXPOSURE LIMITS
CHEMICAL SUBSTANCES DETECTED ON SUBJECT SITE

Compound	Federal OSHA Exposure Limit (mg/m ³)	ACGIH TLV (mg/m ³)	Primary Health Hazard
Barium	0.5	0.002	Dermal and nasal irritant
Beryllium	0.002 0.005C	0.002	Lung disease, suspected carcinogen
Cadmium	0.2	0.05	Respiratory irritant, systemic toxin
Chromium (III)	0.5	0.5	Skin and respiratory irritant
Chromium (VI)	0.5	0.5	Skin, eye, respiratory irritant; rhinitis; lung carcinogen
Copper	1.0	1.0	Skin and eye irritant
Fluoride	2.5	2.5	Skin, eye respiratory irritant; systemic toxin
Lead	0.05	0.15	Systemic and reproductive toxin
Molybdenum (soluble) (insoluble)	5.0 15.0	5.0 10.0	Mucous membrane irritant, low toxicity
Nickel	1.0	0.1	Dermatitis, sinus and lung cancer
Vanadium	0.5	0.05	Eye and bronchial irritant, lung disease
Zinc	5.0	5.0	Irritant, low toxicity

TABLE 4. EXPOSURE TO CONTAMINANTS WITH 5 MG/M³ TOTAL EXPOSURE

	Conc. (mg/kg)	PEL/TLV (mg/m ³)	Exposure (mg/m ³) @ 5 mg/m ³ total dust
Aluminum	3000	10	0.015
Barium	100	0.002	0.0005
Beryllium	0.04	0.002	0.0000002
Cobalt	5	0.05	0.000025
Chromium	40	0.5	0.0002
Copper	2000	1	0.01
Iron	100000	1	0.05
Potassium	200	NE*	0.001
Magnesium	5000	10	0.025
Manganese	200	5	0.001
Molybdenum	10	5	0.00005
Nickel	70	0.1	0.00035
Lead	200	0.05	0.001
Antimony	10	0.5	0.00005
Strontium	20	NE*	0.0001
Titanium	100	NE*	0.0005
Vanadium	10	0.05	0.00005
Zinc	900	5	0.0045

*NE - None established

concentrations of substances and represent conditions during which it is believed that nearly all workers may be repeatedly exposed, 8 hours per day, day after day, for a 40-year working lifetime, without adverse effect. Because of a wide variation in individual susceptibility, however, a small percentage of workers may experience discomfort to chemical substances at concentrations equal to or below the TLV. A still smaller percentage of persons may be affected more seriously from exposures at or below the TLV due to aggravation of a pre-existing condition or the development of an occupational illness. TLVs are based on the best available information from industrial experience, from experimental human and animal studies, and when possible, from a combination of the three sources.

The time-weighted average TLV, or TLV-TWA, represents a time-weighted average exposure for an 8-hour work day, 40-hour work week. The majority of TLVs are expressed as TLV-TWAs. Certain substances have a "Skin" notation following the TLV which implies that the overall exposure to a substance is enhanced by skin, mucous membrane, and/or eye contact exposure. Some substances have a ceiling value designated by the letter "C". Ceiling values should not be exceeded at any time during the work day.

5.1.2 Potential Safety Hazards at Site

<u>Potential Safety Hazard</u>	<u>Required Control Measure(s)</u>
Flying particulate	Goggles and/or safety glasses shall be worn.
Objects striking foot	Boots shall have steel-reinforced toes
Slips, trips, falls	Attempts shall be made to minimize slips, trips, and falls by providing clear footing.
Noise	Ear plugs/ear muffs will be worn as warranted by noise level determinations.
Caustic burns from treated grit pile	Disposable gloves, coveralls, and boot covers will be worn when sampling the treated grit pile.

Formation of hydrogen sulfide gas from treated grit pile.

An action level of 5 ppm will be set. A hydrogen-sulfide monitoring device will be available during field sampling at all times. No work will be initiated if levels are greater than 5 ppm. If hydrogen sulfide exceeds 5 ppm while working, workers will leave the area at once. If levels are >10 ppm, a full-face supplied air respirator is required.

5.1.3 Anticipated Weather Conditions

The anticipated weather conditions at Hunters Point, California, during the proposed work time schedule is expected to include temperatures ranging from approximately mid 60°F to mid 80°F, with a possibility of light wind and rain.

5.1.4 Key Personnel and Responsibilities

- Mr. Gregory L. Headington, Senior Research Technician, will be responsible for sampling, along with Mr. Curtis Bridges, who is also experienced in field sampling. Experience/training includes involvement in numerous field sampling programs and satisfactory completion of a 40-hour Hazardous Waste Training Course plus 8-hour refresher courses.
- Dr. Jeffrey L. Means, Project Manager, will be responsible for supervision, record keeping, and chain-of-custody. Dr. Means is Ex-Chairperson of the Battelle Environmental Sciences Safety Committee and currently Chairperson of the Battelle Radiological Safety Committee.

5.2 Risk Assessment Summary

The activities will involve only minimal disturbance of the sandblasting grit piles. No risk to the communities at or near the site or to the environment is anticipated as a result of the collection of the samples. The source of exposure to the workers will be from particles becoming airborne when emptying the sampling device and the compositing of the samples and

filling of the sample bottles. The total dust exposure as a result of these activities is not expected to approach a concentration of 5 mg/m^3 as an 8-hour, time-weighted average. Even if this exposure level were reached, the exposure to the contaminants would be orders of magnitude below the TLV or PEL (whichever is lower) for the contaminant, as presented in Table 4.

5.3 Personal Protective Equipment

Based upon the risk assessment that exposure to airborne concentrations of metals and their salts during the collection of the samples will be orders of magnitude below the applicable threshold limit values, Level D personal protective equipment shall be worn by all persons entering the work site. The Level D equipment includes the following:

- Coveralls
- Steel-toed boots
- Gloves
- Safety glasses.

In addition, Level C equipment shall be available in the event that upgrading of the protection level is required. This equipment will include outer disposable coveralls; chemical protective gloves and boots; and negative pressure, NIOSH approved, HEPA-filtered respirators in addition to Level D equipment. Level C personal protective equipment will be donned if any of the following conditions occur:

- Unusual odors are detected
- Any irritation of the eyes, nose, or throat is detected.

5.4 Work Practices

The workers will remain upwind of all activities that are expected to result in the potential release of airborne contaminants. This includes emptying of the sampling device, compositing the sample, and filling the sample bottles.

No eating, drinking, chewing of gum, or smoking will be permitted in the work area.

Any skin contact with contaminated or potentially contaminated surfaces, samples, or equipment shall be avoided.

Removal of materials from protective clothing or equipment by blowing, shaking, or any other means that could disperse contaminated materials is prohibited.

5.5 Decontamination

All disposable materials, including disposable gloves, paper towels, etc., will be placed in appropriately marked containers (e.g., plastic bags) and left at the site, secured tightly under the tarps covering the piles. These materials shall be disposed of later during the field treatment demonstration of the asphalt recycling technology. Sampling equipment will be decontaminated with paper towels between samples and by three wipedowns with damp paper towels at the conclusion of the sampling activity.

5.6 Emergency Plans

The Point-of-Contact at the Hunters Point Naval Station in the event of emergency is as follows:

San Francisco General Hospital - (415) 821-8111/8200
St. Luke's Hospital - (415) 864-8600/6625
Mr. Kam Tung - Hunters Point Annex Contact - (415) 822-1243
Base Security - Hunters Point Annex - (415) 641-2535/6056
Fire Department - Hunters Point Annex - (415) 822-6635

Mr. Richard Powell - WESTDIV/NAVFAC - (415) 244-2554
Officer-in-Charge, Hunters Point Annex - (415) 822-4229
National Response Center - (800) 924-8802
EPA, Emergency Response Section - (415) 974-7511
Chemtrec (24 hours) - (800) 424-9300
Department of Health Services, Emeryville - (415) 540-3816
San Francisco Office of Emergency Services - (415) 441-6020.

The emergency care medical facility nearest the subject site is San Francisco General Hospital located at 1001 Portrero Avenue, San Francisco, CA, at Portrero and 23rd Street. The police, fire department, paramedics, and ambulance may be reached via telephone by dialing 911.

These telephone numbers shall be posted at the worksite.

COMMENTS ON DRAFT
SAMPLING AND ANALYSIS PLAN
AND RESPONSES

RESPONSE TO COMMENTS ON DRAFT HUNTERS POINT
SAMPLING AND ANALYSIS PLAN OF JUNE 28, 1990

A) Comments dated August 3, 1990 from Mr. Mark Malinowski, Engineering Geologist, Region 2, Department of Health Services

- 1) Comment: Page 8, Sec. 2.4, Specify that the labs used for Samples A & C will be California certified (hazardous waste) labs.
- 1) Response: Last sentence in Section 2.4 will be modified to read: "Sample C to an analytical laboratory certified in the State of California for the analytes being measured."
- 2) Comment: Page 9, Sec. 2.5, Specify the analytical methods (EPA number) to be used for analysis. Further specify how reactive sulfides will be tested.
- 2) Response: Statement will be added to the end of Section 2.5: "Analytical methods to be used are specified in Attachment A (attached also to this letter). Reactive sulfide will be measured using the procedure specified in Section 7.3 of SW-846. In addition the analyst will be instructed to measure the pH of the reactive sulfide/waste solution at the conclusion of the test. Further, the analyst will also be instructed to measure the pH of the WET and TCLP leachates at the conclusion of the leaching tests."
- 3) Comment: Page 10, Sec. 3.1, Do you plan on using results from previous sampling of the treated grit to perform the statistical analysis?
- 3) Response: The following statement will be added to the end of Section 3.1.2.6: "The statistical analysis of data from the treated pile will include data only generated from the sampling event discussed herein. The results of previous sampling events will not be included because those data were not collected under the design and controls specified in this plan."
- 4) Comment: Page 20, Sec. 5.6, DHS recommends that a map be placed in the front of the workplan with the route to the nearest hospital clearly marked.
- 4) Response: The following statement will be added after the sentence beginning with "The emergency care..." on p. 21: "A map clearly showing the route from the site to this hospital is attached and will be posted at the site during sampling" [see Attachment B].

B) Comments dated July 30, 1990 from Mr. Chuck Flipppo, Federal Enforcement Section, U.S. Environmental Protection Agency, Region IX:

- 1) Comment: Pages 8-9, Section 2.5, Sample Analysis. As I discussed with Jeff Heath by phone, you need to add a priority pollutant analysis to determine whether any organic substances are present.
- 1) Response: Tables 1 and 2 will be modified to include "Priority Pollutant Analysis - 1 [sample]" That is, we will be analyzing 1 sample from each of the untreated and treated grit piles for priority pollutants.
- 2) Comment: Page 12, Section 3.1.2.6. What will be the basis for determining whether three, four, or five samples are taken within a given grid?
- 2) Response: The second sentence in Section 3.1.2.5 will be modified as follows: "Five subsamples will be composited from the four corners of the grid and the center, unless the grit pile proves difficult to sample, in which case a minimum of three subsamples from each grid will be composited."
- 3) Comment: Page 20, Section 5.5. What is the rationale for leaving the disposable materials at the site until the field demonstration phase, rather than disposing of them immediately or placing them in the storage area for IR field work wastes? Are these to be tested to determine whether they are "hazardous waste?"
- 3) Response: Section 5.5 will be modified to read as follows: "All disposable materials, including disposable gloves, paper towels, etc. will be disposed as nonhazardous waste. Sampling equipment will be decontaminated between samples and at the conclusion of the sampling activity and shipped back to Columbus. Materials would have to include approximately 15% by weight sandblasting grit in order to be considered hazardous (California-only). Any material so conspicuously contaminated will be decontaminated in the field prior to disposal or removal from the site."

ATTACHEMENT A:
ANALYTICAL METHODS

METHODS USED FOR CHEMICAL ANALYSES

Extraction Methods:

TTLC - California Title 22 CCR 66699

STLC - California Title 22 CCR 66699

EP Tox - EPA 1310

MEP - EPA 1320

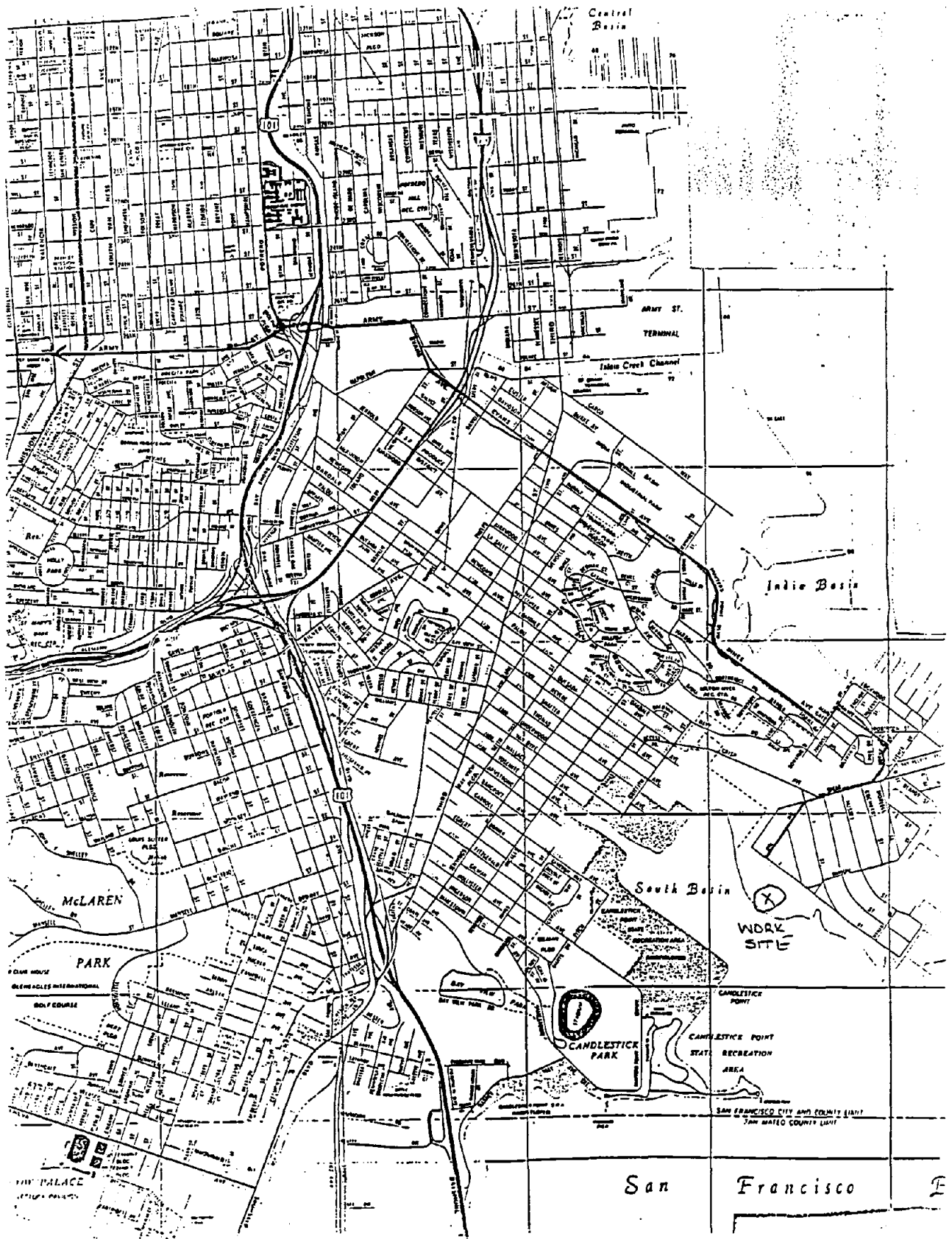
pH EPA 9045

Reactive Sulfide - SW-846, Part II, Section 7.3

Analytical Methods for Metals (TTLC, STLC, EP Tox, and MEP):

Barium	EPA 7080
Antimony	EPA 7040
Arsenic	EPA 7061
Barium	EPA 7080
Beryllium	EPA 7090
Cadmium	EPA 7130
Chromium, Total	EPA 7190
Chromium, (VI)	EPA 7196
Cobalt	EPA 7200
Copper	EPA 7210
Lead	EPA 7420
Mercury	EPA 7471
Molybdenum	EPA 7480
Nickel	EPA 7520
Selenium	EPA 7741
Silver	EPA 7760
Thallium	EPA 7840
Vandium	EPA 7910
Zinc	EPA 7950

ATTACHMENT B
MAP TO HOSPITAL



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ENSECO-CRL DATA

Enseco - CRL

2810 Bunsen Ave. Unit A • Ventura, CA 93003
(805) 650-0546 • FAX: (805) 650-0756

Battelle
505 King Avenue
Columbus, Ohio 43201-2693
Telefax # 614-424-5263

10/22/90

Attn: Greg Headington
614/424/5417

Project: Hunters Point
#G8558-8301, B0906901.LCR

Sample #: 0261171501
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/14/90, 1330
Method: Not Specified

I.D.: HPU-26C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
pH @ 20 C of TCLP Extract	EPA 9045	5.2		
-TCLP Metals		See Attached		

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Columbus, Ohio 43201-2693
Telefax # 614-424-5263

10/22/90

Attn: Greg Headington
614/424/5417

Project: Hunters Point
#G8558-8301, B0906901.LCR

Sample #: 0261171502
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/14/90, 1440
Method: Not Specified

I.D.: HPU-133C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
pH @ 20 C of TCLP Extract	EPA 9045	5.0		
-TCLP Metals		See Attached		
-CCR (TCLC) Metals (Title 22)		-		
Antimony	EPA 7040	ND <20	mg/kg	20
Arsenic	EPA 7061	0.8	mg/kg	0.1
Barium	EPA 7080	440	mg/kg	20
Beryllium	EPA 7090	ND <0.6	mg/kg	0.6
Cadmium	EPA 7130	ND <1	mg/kg	1
Chromium, Total	EPA 7190	29	mg/kg	1
Cobalt	EPA 7200	6	mg/kg	2
Copper	EPA 7210	1500	mg/kg	1
Lead	EPA 7420	110	mg/kg	5
Mercury	EPA 7471	ND <0.1	mg/kg	0.1
Molybdenum	EPA 7480	ND <10	mg/kg	10
Nickel	EPA 7520	18	mg/kg	1
Selenium	EPA 7741	ND <0.1	mg/kg	0.1
Silver	EPA 7760	ND <1	mg/kg	1
Thallium	EPA 7840	ND <6	mg/kg	6
Vanadium	EPA 7910	ND <20	mg/kg	20
Zinc	EPA 7950	1200	mg/kg	1
Chromium (VI)	EPA 7196	ND <1	mg/kg	1
-CCR (STLC) Metals (Title 22)		-		

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CONSTITUENT	METHOD	RESULT	UNIT	MDL
Antimony	(STLC) EPA 7040	ND <1	mg/L	1
Arsenic	(STLC) EPA 7061	0.05	mg/L	0.01
Barium	(STLC) EPA 208.1	6.8	mg/L	1
Beryllium	(STLC) EPA 7090	ND <0.03	mg/L	0.03
Cadmium	(STLC) EPA 7130	ND <0.05	mg/L	0.05
Chromium	(STLC) EPA 7190	1.2	mg/L	0.1
Cobalt	(STLC) EPA 7200	ND <0.2	mg/L	0.2
Copper	(STLC) EPA 7210	110	mg/L	0.05
Lead	(STLC) EPA 7420	7.1	mg/L	0.2
Mercury	(STLC) EPA 7471	ND <0.01	mg/L	0.01
Molybdenum	(STLC) EPA 7480	ND <1	mg/L	1
Nickel	(STLC) EPA 7520	0.5	mg/L	0.2
Selenium	(STLC) EPA 7741	ND <0.01	mg/L	0.01
Silver	(STLC) EPA 7760	ND <0.05	mg/L	0.05
Thallium	(STLC) EPA 7840	ND <0.3	mg/L	0.3
Vanadium	(STLC) EPA 7910	ND <1	mg/L	1
Zinc	(STLC) EPA 7950	190	mg/L *	0.05
Chromium (VI)	(STLC) EPA 7196	ND <1	mg/L	1
pH @ 20 C of STLC Extract	EPA 9045	5.1		

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505 King Avenue
Columbus, Ohio 43201-2693
Telefax # 614-424-5263

10/22/90

Attn: Greg Headington
614/424/5417

Project: Hunters Point
#G8558-8301, B0906901.LCR

Sample #: 0261171507
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/14/90, 1515
Method: Not Specified

I.D.: HPU-51C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
pH @ 20 C of TCLP Extract	EPA 9045	5.0		
-TCLP Metals		See Attached		
-CCR (TCLC) Metals (Title 22)		-		
Antimony	EPA 7040	ND <20	mg/kg	20
Arsenic	EPA 7061	1.7	mg/kg	0.1
Barium	EPA 7080	360	mg/kg	20
Beryllium	EPA 7090	ND <0.6	mg/kg	0.6
Cadmium	EPA 7130	1	mg/kg	1
Chromium, Total	EPA 7190	85	mg/kg	1
Cobalt	EPA 7200	14	mg/kg	2
Copper	EPA 7210	2000	mg/kg	1
Lead	EPA 7420	320	mg/kg	5
Mercury	EPA 7471	ND <0.1	mg/kg	0.1
Molybdenum	EPA 7480	ND <10	mg/kg	10
Nickel	EPA 7520	94	mg/kg	1
Selenium	EPA 7741	ND <0.1	mg/kg	0.1
Silver	EPA 7760	ND <1	mg/kg	1
Thallium	EPA 7840	ND <6	mg/kg	6
Vanadium	EPA 7910	26	mg/kg	20
Zinc	EPA 7950	1400	mg/kg	1
Chromium (VI)	EPA 7196	6.6	mg/kg	1
-CCR (STLC) Metals (Title 22)		-		

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CONSTITUENT	METHOD	RESULT	UNIT	MDL
Antimony (STLC)	EPA 7040	ND <1	mg/L	1
Arsenic (STLC)	EPA 7061	0.07	mg/L	0.01
Barium (STLC)	EPA 208.1	6.3	mg/L	1
Beryllium (STLC)	EPA 7090	ND <0.03	mg/L	0.03
Cadmium (STLC)	EPA 7130	0.06	mg/L	0.05
Chromium (STLC)	EPA 7190	2.5	mg/L	0.1
Cobalt (STLC)	EPA 7200	ND <0.2	mg/L	0.2
Copper (STLC)	EPA 7210	140	mg/L	0.05
Lead (STLC)	EPA 7420	18	mg/L	0.2
Mercury (STLC)	EPA 7471	ND <0.01	mg/L	0.01
Molybdenum (STLC)	EPA 7480	ND <1	mg/L	1
Nickel (STLC)	EPA 7520	1.1	mg/L	0.2
Selenium (STLC)	EPA 7741	ND <0.01	mg/L	0.01
Silver (STLC)	EPA 7760	ND <0.05	mg/L	0.05
Thallium (STLC)	EPA 7840	ND <0.3	mg/L	0.3
Vanadium (STLC)	EPA 7910	ND <1	mg/L	1
Zinc (STLC)	EPA 7950	130	mg/L	0.05
Chromium (VI) (STLC)	EPA 7196	ND <1	mg/L	1
pH @ 20 C of STLC Extract	EPA 9045	5.2		

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Battelle
505 King Avenue
Columbus, Ohio 43201-2693
Telefax # 614-424-5263

10/22/90

Attn: Greg Headington
614/424/5417

Project: Hunters Point
#G8558-8301, B0906901.LCR

Sample #: 0261171512
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/14/90, 1330
Method: Not Specified

I.D.: HPU-29C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
pH @ 20 C of TCLP Extract	EPA 9045	5.1		
-TCLP Metals		See Attached		

Enseco - CRL

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Telefax # 614-424-5263

10/22/90

Attn: Greg Headington
614/424/5417

Project: Hunters Point
#G8558-8301, B0906901.LCR

Sample #: 0261171513
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/14/90, 1405
Method: Not Specified

I.D.: HPU-62C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
pH @ 20 C of TCLP Extract	EPA 9045	5.1		
-TCLP Metals		See Attached		

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Attn: Greg Headington
614/424/5417

Project: Hunters Point
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Sample #: 0261171514
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/14/90, 1230
Method: Not Specified

I.D.: HPU-69C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
pH @ 20 C of TCLP Extract	EPA 9045	5.0		
-TCLP Metals		See Attached		
-CCR (TILC) Metals (Title 22)		-		
Antimony	EPA 7040	ND <20	mg/kg	20
Arsenic	EPA 7061	1.1	mg/kg	0.1
Barium	EPA 7080	150	mg/kg	20
Beryllium	EPA 7090	ND <0.6	mg/kg	0.6
Cadmium	EPA 7130	1	mg/kg	1
Chromium, Total	EPA 7190	59	mg/kg	1
Cobalt	EPA 7200	8	mg/kg	2
Copper	EPA 7210	2000	mg/kg	1
Lead	EPA 7420	330	mg/kg	5
Mercury	EPA 7471	ND <0.1	mg/kg	0.1
Molybdenum	EPA 7480	ND <10	mg/kg	10
Nickel	EPA 7520	55	mg/kg	1
Selenium	EPA 7741	ND <0.1	mg/kg	0.1
Silver	EPA 7760	ND <1	mg/kg	1
Thallium	EPA 7840	ND <6	mg/kg	6
Vanadium	EPA 7910	ND <20	mg/kg	20
Zinc	EPA 7950	1400	mg/kg	1
Chromium (VI)	EPA 7196	3.9	mg/kg	1
-CCR (STLC) Metals (Title 22)		-		

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CONSTITUENT	METHOD	RESULT	UNIT	MDL
Antimony	(STLC) EPA 7040	ND <1	mg/L	1
Arsenic	(STLC) EPA 7061	0.07	mg/L	0.01
Barium	(STLC) EPA 208.1	7.4	mg/L	1
Beryllium	(STLC) EPA 7090	ND <0.03	mg/L	0.03
Cadmium	(STLC) EPA 7130	0.06	mg/L	0.05
Chromium	(STLC) EPA 7190	2.2	mg/L	0.1
Cobalt	(STLC) EPA 7200	ND <0.2	mg/L	0.2
Copper	(STLC) EPA 7210	200	mg/L	0.05
Lead	(STLC) EPA 7420	21	mg/L	0.2
Mercury	(STLC) EPA 7471	ND <0.01	mg/L	0.01
Molybdenum	(STLC) EPA 7480	ND <1	mg/L	1
Nickel	(STLC) EPA 7520	1.4	mg/L	0.2
Selenium	(STLC) EPA 7741	ND <0.01	mg/L	0.01
Silver	(STLC) EPA 7760	ND <0.05	mg/L	0.05
Thallium	(STLC) EPA 7840	ND <0.3	mg/L	0.3
Vanadium	(STLC) EPA 7910	ND <1	mg/L	1
Zinc	(STLC) EPA 7950	180	mg/L *	0.05
Chromium (VI)	(STLC) EPA 7196	ND <1	mg/L	1
pH @ 20 C of STLC Extract	EPA 9045	5.2		

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Project: Hunters Point
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Sample #: 0261171519
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/14/90, 1250
Method: Not Specified

I.D.: HPU-269C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
pH @ 20 C of TCLP Extract	EPA 9045	5.1		
-TCLP Metals		See Attached		

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Attn: Greg Headington
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Project: Hunters Point
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Sample #: 0261171520
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/14/90, 1815
Method: Not Specified

I.D.: HPT-144C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
Copper (STLC)	EPA 7210	1.1	mg/L	0.05
Copper	EPA 7210	1600	mg/kg	1
Lead (STLC)	EPA 7420	5.2	mg/L	0.2
Lead	EPA 7420	160	mg/kg	5
pH @ 20 C of STLC Extract	EPA 9045	5.6		
pH @ 20 C (1:1 H2O Dilution)	EPA 9045	12		

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Attn: Greg Headington
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Project: Hunters Point
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Sample #: 0261171521
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/16/90, 1620
Method: Not Specified

I.D.: HPT-213C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
Copper (STLC)	EPA 7210	110	mg/L	0.05
Copper	EPA 7210	1500	mg/kg	1
Lead (STLC)	EPA 7420	15	mg/L	0.2
Lead	EPA 7420	180	mg/kg	5
Sulfide, Reactive	EPA SW846 Sec-7	ND	<50 mg/kg	50
pH - Reac. Sulfide Spent Soln.	EPA 9045	<2		
pH @ 20 C (1:1 H2O Dilution)	EPA 9045	10.8		
pH @ 20 C of STLC Extract	EPA 9045	5.3		

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Project: Hunters Point
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Sample #: 0261171522
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/16/90, 1530
Method: Not Specified

I.D.: HPT-83C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
Copper (STLC)	EPA 7210	12	mg/L	0.05
Copper	EPA 7210	680	mg/kg	1
Lead (STLC)	EPA 7420	15	mg/L	0.2
Lead	EPA 7420	200	mg/kg	5
pH @ 20 C of STLC Extract	EPA 9045	5.5		
pH @ 20 C (1:1 H2O Dilution)	EPA 9045	12.6		

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Attn: Greg Headington
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Project: Hunters Point
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Sample #: 0261171523
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/14/90, 1700
Method: Not Specified

I.D.: HPT-172C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
Copper (STLC)	EPA 7210	100	mg/L	0.05
Copper	EPA 7210	1500	mg/kg	1
Lead (STLC)	EPA 7420	11	mg/L	0.2
Lead	EPA 7420	140	mg/kg	5
pH @ 20 C of STLC Extract	EPA 9045	5.4		
pH @ 20 C (1:1 H2O Dilution)	EPA 9045	10.9		

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Project: Hunters Point
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Sample #: 0261171524
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/14/90, 1800
Method: Not Specified

I.D.: HPT-158C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
Copper (STLC)	EPA 7210	89	mg/L	0.05
Copper	EPA 7210	1300	mg/kg	1
Lead (STLC)	EPA 7420	12	mg/L	0.2
Lead	EPA 7420	150	mg/kg	5
Sulfide, Reactive	EPA SW846 Sec-7	ND	<50 mg/kg	50
pH - Reac. Sulfide Spent Soln.	EPA 9045	<2		
pH @ 20 C of STLC Extract	EPA 9045	5.4		
pH @ 20 C (1:1 H2O Dilution)	EPA 9045	10.4		

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Attn: Greg Headington
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Project: Hunters Point
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Sample #: 0261171525
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/16/90, 1110
Method: Not Specified

I.D.: HPT-190C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
Copper (STLC)	EPA 7210	140	mg/L	0.05
Copper	EPA 7210	1600	mg/kg	1
Lead (STLC)	EPA 7420	13	mg/L	0.2
Lead	EPA 7420	150	mg/kg	5
pH @ 20 C of STLC Extract	EPA 9045	5.3		
pH @ 20 C (1:1 H2O Dilution)	EPA 9045	10.6		

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Project: Hunters Point
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Sample #: 0261171526
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/16/90, 1020
Method: Not Specified

I.D.: HPT-230C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
Copper (STLC)	EPA 7210	ND <0.05	mg/L	0.05
Copper	EPA 7210	1600	mg/kg	1
Lead (STLC)	EPA 7420	ND <0.2	mg/L	0.2
Lead	EPA 7420	150	mg/kg	5
Sulfide, Reactive	EPA SW846 Sec-7	ND <50	mg/kg	50
pH - Reac. Sulfide Spent Soln.	EPA 9045	2.4		
pH @ 20 C of STLC Extract	EPA 9045	5.9		
pH @ 20 C (1:1 H2O Dilution)	EPA 9045	12.6		

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Project: Hunters Point
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Sample #: 0261171527
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/16/90, 1555
Method: Not Specified

I.D.: HPT-250C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
Copper (STLC)	EPA 7210	16	mg/L	0.05
Copper	EPA 7210	1500	mg/kg	1
Lead (STLC)	EPA 7420	9.9	mg/L	0.2
Lead	EPA 7420	130	mg/kg	5
Sulfide, Reactive	EPA SW846 Sec-7	ND <50	mg/kg	50
pH - Reac. Sulfide Spent Soln.	EPA 9045	2.0		
pH @ 20 C of STLC Extract	EPA 9045	5.6		
pH @ 20 C (1:1 H2O Dilution)	EPA 9045	11.7		

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Project: Hunters Point
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Sample #: 0261171528
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/16/90, 1225
Method: Not Specified

I.D.: HPT-90C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
Copper (STLC)	EPA 7210	26	mg/L	0.05
Copper	EPA 7210	1100	mg/kg	1
Lead (STLC)	EPA 7420	14	mg/L	0.2
Lead	EPA 7420	190	mg/kg	5
Sulfide, Reactive	EPA SW846 Sec-7	ND <50	mg/kg	50
pH - Reac. Sulfide Spent Soln.	EPA 9045	2.2		
pH @ 20 C of STLC Extract	EPA 9045	5.6		
pH @ 20 C (1:1 H2O Dilution)	EPA 9045	11.9		

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Project: Hunters Point
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Sample #: 0261171529
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/16/90, 1100
Method: Not Specified

I.D.: HPT-261C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
Copper (STLC)	EPA 7210	11	mg/L	0.05
Copper	EPA 7210	1300	mg/kg	1
Lead (STLC)	EPA 7420	7.1	mg/L	0.2
Lead	EPA 7420	120	mg/kg	5
Sulfide, Reactive	EPA SW846 Sec-7	ND	<50 mg/kg	50
pH - Reac. Sulfide Spent Soln.	EPA 9045	4.5		
pH @ 20 C of STLC Extract	EPA 9045	5.6		
pH @ 20 C (1:1 H2O Dilution)	EPA 9045	11.7		

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Project: Hunters Point
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Sample #: 0261171530
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/16/90, 0925
Method: Not Specified

I.D.: HPT-216C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
Copper (STLC)	EPA 7210	91	mg/L	0.05
Copper	EPA 7210	1600	mg/kg	1
Lead (STLC)	EPA 7420	13	mg/L	0.2
Lead	EPA 7420	170	mg/kg	5
Sulfide, Reactive	EPA SW846 Sec-7	ND	<50 mg/kg	50
pH - Reac. Sulfide Spent Soln.	EPA 9045	6.7		
pH @ 20 C of STLC Extract	EPA 9045	5.5		
pH @ 20 C (1:1 H2O Dilution)	EPA 9045	11		

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Project: Hunters Point
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Sample #: 0261171531
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/14/90, 1750
Method: Not Specified

I.D.: HPT-134C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
Copper (STLC)	EPA 7210	110	mg/L	0.05
Copper	EPA 7210	1300	mg/kg	1
Lead (STLC)	EPA 7420	18	mg/L	0.2
Lead	EPA 7420	210	mg/kg	5
Sulfide, Reactive	EPA SW846 Sec-7	ND	<50 mg/kg	50
pH - Reac. Sulfide Spent Soln.	EPA 9045	6.6		
pH @ 20 C of STLC Extract	EPA 9045	5.4		
pH @ 20 C (1:1 H2O Dilution)	EPA 9045	11.1		

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Attn: Greg Headington
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Project: Hunters Point
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Sample #: 0261171532
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/16/90, 1315
Method: Not Specified

I.D.: HPT-88C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
Copper (STLC)	EPA 7210	0.31	mg/L	0.05
Copper	EPA 7210	1000	mg/kg	1
Lead (STLC)	EPA 7420	2.4	mg/L	0.2
Lead	EPA 7420	150	mg/kg	5
pH @ 20 C of STLC Extract	EPA 9045	5.9		
pH @ 20 C (1:1 H2O Dilution)	EPA 9045	12.4		

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Project: Hunters Point
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Sample #: 0261171533
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/16/90, 1620
Method: Not Specified

I.D.: HPT-388C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
Copper (STLC)	EPA 7210	2.0	mg/L	0.05
Copper	EPA 7210	1200	mg/kg	1
Lead (STLC)	EPA 7420	5.5	mg/L	0.2
Lead	EPA 7420	160	mg/kg	5
pH @ 20 C of STLC Extract	EPA 9045	5.8		
pH @ 20 C (1:1 H2O Dilution)	EPA 9045	12.4		

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Sample #: 0261171534
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/16/90, 1555
Method: Not Specified

I.D.: HPT-361C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
Copper (STLC)	EPA 7210	6.8	mg/L	0.05
Copper	EPA 7210	1400	mg/kg	1
Lead (STLC)	EPA 7420	7.3	mg/L	0.2
Lead	EPA 7420	150	mg/kg	5
Sulfide, Reactive	EPA SW846 Sec-7	ND <50	mg/kg	50
pH - Reac. Sulfide Spent Soln.	EPA 9045	4.0		
pH @ 20 C of STLC Extract	EPA 9045	5.6		
pH @ 20 C (1:1 H2O Dilution)	EPA 9045	11.6		

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Sample #: 0261171535
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/16/90, 1400
Method: Not Specified

I.D.: HPT-106C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
pH @ 20 C of TCLP Extract	EPA 9045	6.3		
-TCLP Metals		See Attached		
pH @ 20 C (1:1 H2O Dilution)	EPA 9045	12.5		
-CCR (TTLC) Metals (Title 22)		-		
Antimony	EPA 7040	ND <20 mg/kg		20
Arsenic	EPA 7061	1.6 mg/kg		0.1
Barium	EPA 7080	150 mg/kg		20
Beryllium	EPA 7090	ND <0.6 mg/kg		0.6
Cadmium	EPA 7130	ND <1 mg/kg		1
Chromium, Total	EPA 7190	37 mg/kg		1
Cobalt	EPA 7200	10 mg/kg		2
Copper	EPA 7210	1100 mg/kg		1
Lead	EPA 7420	160 mg/kg		5
Mercury	EPA 7471	ND <0.1 mg/kg		0.1
Molybdenum	EPA 7480	ND <10 mg/kg		10
Nickel	EPA 7520	72 mg/kg		1
Selenium	EPA 7741	ND <0.1 mg/kg		0.1
Silver	EPA 7760	ND <1 mg/kg		1
Thallium	EPA 7840	ND <6 mg/kg		6
Vanadium	EPA 7910	24 mg/kg		20
Zinc	EPA 7950	800 mg/kg		1
Chromium (VI)	EPA 7196	ND <1 mg/kg		1

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CONSTITUENT	METHOD	RESULT	UNIT	MDL
-CCR (STLC) Metals (Title 22)		-		
Antimony (STLC)	EPA 7040	ND <1	mg/L	1
Arsenic (STLC)	EPA 7061	0.05	mg/L	0.01
Barium (STLC)	EPA 208.1	4.5	mg/L	1
Beryllium (STLC)	EPA 7090	ND <0.03	mg/L	0.03
Cadmium (STLC)	EPA 7130	ND <0.05	mg/L	0.05
Chromium (STLC)	EPA 7190	1.5	mg/L	0.1
Cobalt (STLC)	EPA 7200	ND <0.2	mg/L	0.2
Copper (STLC)	EPA 7210	24	mg/L	0.05
Lead (STLC)	EPA 7420	12	mg/L	0.2
Mercury (STLC)	EPA 7471	ND <0.01	mg/L	0.01
Molybdenum (STLC)	EPA 7480	ND <1	mg/L	1
Nickel (STLC)	EPA 7520	1.5	mg/L	0.2
Selenium (STLC)	EPA 7741	0.015	mg/L	0.01
Silver (STLC)	EPA 7760	ND <0.05	mg/L	0.05
Thallium (STLC)	EPA 7840	ND <0.3	mg/L	0.3
Vanadium (STLC)	EPA 7910	ND <1	mg/L	1
Zinc (STLC)	EPA 7950	70	mg/L	0.05
Chromium (VI) (STLC)	EPA 7196	ND <1	mg/L	1
pH @ 20 C of STLC Extract	EPA 9045	6.4		

Enseco - CRL

2810 Bunsen Ave. Unit A • Ventura, CA 93003
(805) 650-0546 • FAX: (805) 650-0756

Battelle
505 King Avenue
Columbus, Ohio 43201-2693
Telefax # 614-424-5263

10/22/90

Attn: Greg Headington
614/424/5417

Project: Hunters Point
#G8558-8301, B0906901.LCR

Sample #: 0261171541
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/16/90, 1205
Method: Not Specified

I.D.: HPT-62C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
pH @ 20 C of TCLP Extract	EPA 9045	7.4		
-TCLP Metals		See Attached		
pH @ 20 C (1:1 H2O Dilution)	EPA 9045	12.2		
-CCR (TTLIC) Metals (Title 22)		-		
Antimony	EPA 7040	ND <20	mg/kg	20
Arsenic	EPA 7061	1.7	mg/kg	0.1
Barium	EPA 7080	240	mg/kg	20
Beryllium	EPA 7090	ND <0.6	mg/kg	0.6
Cadmium	EPA 7130	1	mg/kg	1
Chromium, Total	EPA 7190	40	mg/kg	1
Cobalt	EPA 7200	10	mg/kg	2
Copper	EPA 7210	1400	mg/kg	1
Lead	EPA 7420	200	mg/kg	5
Mercury	EPA 7471	ND <0.1	mg/kg	0.1
Molybdenum	EPA 7480	ND <10	mg/kg	10
Nickel	EPA 7520	62	mg/kg	1
Selenium	EPA 7741	ND <0.1	mg/kg	0.1
Silver	EPA 7760	ND <1	mg/kg	1
Thallium	EPA 7840	ND <6	mg/kg	6
Vanadium	EPA 7910	ND <20	mg/kg	20
Zinc	EPA 7950	1200	mg/kg	1
Chromium (VI)	EPA 7196	ND <1	mg/kg	1

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CONSTITUENT	METHOD	RESULT	UNIT	MDL
-CCR (STLC) Metals (Title 22)		-		
Antimony (STLC)	EPA 7040	ND <1	mg/L	1
Arsenic (STLC)	EPA 7061	0.20	mg/L	0.01
Barium (STLC)	EPA 208.1	1.3	mg/L	1
Beryllium (STLC)	EPA 7090	ND <0.03	mg/L	0.03
Cadmium (STLC)	EPA 7130	0.06	mg/L	0.05
Chromium (STLC)	EPA 7190	1.8	mg/L	0.1
Cobalt (STLC)	EPA 7200	0.2	mg/L	0.2
Copper (STLC)	EPA 7210	140	mg/L	0.05
Lead (STLC)	EPA 7420	20	mg/L	0.2
Mercury (STLC)	EPA 7471	ND <0.01	mg/L	0.01
Molybdenum (STLC)	EPA 7480	ND <1	mg/L	1
Nickel (STLC)	EPA 7520	1.2	mg/L	0.2
Selenium (STLC)	EPA 7741	ND <0.005	mg/L	0.01
Silver (STLC)	EPA 7760	ND <0.05	mg/L	0.05
Thallium (STLC)	EPA 7840	ND <0.3	mg/L	0.3
Vanadium (STLC)	EPA 7910	ND <1	mg/L	1
Zinc (STLC)	EPA 7950	120	mg/L	0.05
Chromium (VI) (STLC)	EPA 7196	ND <1	mg/L	1
pH @ 20 C of STLC Extract	EPA 9045	5.5		

Enseco - CRL

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Battelle
505 King Avenue
Columbus, Ohio 43201-2693
Telefax # 614-424-5263

10/22/90

Attn: Greg Headington
614/424/5417

Project: Hunters Point
#G8558-8301, B0906901.LCR

Sample #: 0261171547
Received: 09/18/90
Type: Soil

Collector: Client
Sampling Date & Time: 09/16/90, 1140
Method: Not Specified

I.D.: HPT-263C

CONSTITUENT	METHOD	RESULT	UNIT	MDL
pH @ 20 C of TCLP Extract	EPA 9045	6.8		
-TCLP Metals		See Attached		
pH @ 20 C (1:1 H2O Dilution)	EPA 9045	10.2		
-CCR (TTLC) Metals (Title 22)		-		
Antimony	EPA 7040	ND <20	mg/kg	20
Arsenic	EPA 7061	1.2	mg/kg	0.1
Barium	EPA 7080	100	mg/kg	20
Beryllium	EPA 7090	ND <0.6	mg/kg	0.6
Cadmium	EPA 7130	ND <1	mg/kg	1
Chromium, Total	EPA 7190	25	mg/kg	1
Cobalt	EPA 7200	6	mg/kg	2
Copper	EPA 7210	1400	mg/kg	1
Lead	EPA 7420	150	mg/kg	5
Mercury	EPA 7471	ND <0.1	mg/kg	0.1
Molybdenum	EPA 7480	ND <10	mg/kg	10
Nickel	EPA 7520	29	mg/kg	1
Selenium	EPA 7741	0.1	mg/kg	0.1
Silver	EPA 7760	ND <1	mg/kg	1
Thallium	EPA 7840	ND <6	mg/kg	6
Vanadium	EPA 7910	ND <20	mg/kg	20
Zinc	EPA 7950	880	mg/kg	1
Chromium (VI)	EPA 7196	ND <1	mg/kg	1

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CONSTITUENT	METHOD	RESULT	UNIT	MDL
-CCR (STLC) Metals (Title 22)		-		
Antimony (STLC)	EPA 7040	ND <1	mg/L	1
Arsenic (STLC)	EPA 7061	0.08	mg/L	0.01
Barium (STLC)	EPA 208.1	1	mg/L	1
Beryllium (STLC)	EPA 7090	ND <0.03	mg/L	0.03
Cadmium (STLC)	EPA 7130	ND <0.05	mg/L	0.05
Chromium (STLC)	EPA 7190	1.0	mg/L	0.1
Cobalt (STLC)	EPA 7200	ND <0.2	mg/L	0.2
Copper (STLC)	EPA 7210	120	mg/L	0.05
Lead (STLC)	EPA 7420	19	mg/L	0.2
Mercury (STLC)	EPA 7471	ND <0.01	mg/L	0.01
Molybdenum (STLC)	EPA 7480	ND <1	mg/L	1
Nickel (STLC)	EPA 7520	1.0	mg/L	0.2
Selenium (STLC)	EPA 7741	0.010	mg/L	0.01
Silver (STLC)	EPA 7760	ND <0.05	mg/L	0.05
Thallium (STLC)	EPA 7840	ND <0.3	mg/L	0.3
Vanadium (STLC)	EPA 7910	ND <1	mg/L	1
Zinc (STLC)	EPA 7950	78	mg/L	0.05
Chromium (VI) (STLC)	EPA 7196	ND <1	mg/L	1
pH @ 20 C of STLC Extract	EPA 9045	5.3		


Reviewed


Approved

* Apparent discrepancy between Zinc STLC and TTLC is most likely due to sample heterogeneity.

Enseco - CRL

7440 Lincoln Way • Garden Grove, CA 92641
(714) 898-6370 • (213) 598-0458 • (800) LAB-1-CRL
FAX: (714) 891-5917

October 17, 1990

ENSECO CRL VENTURA
2810 BUNSEN AVE., UNIT A
VENTURA, CA 93003
ATTN: MR. LEO RAAB

Analysis No.: G-9026305-001/019
Date Sampled: 14-SEP-1990
16-SEP-1990
Date Sample Rec'd: 20-SEP-1990
Project: (02611715) BATELLE

Enclosed with this letter is the report on the chemical and physical analyses on the samples from ANALYSIS NO: G-9026305-001/019 shown above.

The samples were received by CRL in a chilled state, intact and with the chain-of-custody record attached.

Note that ND() means not detected at the reporting limit expressed within the parentheses. The reporting limit is raised to reflect the dilution factor of of the sample.

Solid samples are reported on "as received" basis.


Reviewed


Approved

The Report Cover Letter is an integral part of this report.

This report pertains only to the samples investigated and does not necessarily apply to other apparently identical or similar materials. This report is submitted for the exclusive use of the client to whom it is addressed. Any reproduction of this report or use of this Laboratory's name for advertising or publicity purposes without authorization is prohibited.

Laboratory Report

ENSECO CRL VENTURA
2810 BUNSEN AVENUE, UNIT A
VENTURA, CA 93003
ATTN: MR. LEO RAAB

Analysis No.: G-9026305-001
Date Sampled: 14-SEP-1990
Date Sample Rec'd: 20-SEP-1990
Sample Type: SOLID

Project: (02611715) BATELLE
Sample ID: (02611715-02) HPV-133C

METALS Prepared by EPA 3010 By NL
MERCURY Prepared by HG PREP By NL

Parameter	Units	Sample Result	Sample RL	Blank Result	Blank RL	Date Prepared	Date Analyzed	By
Arsenic/TCLP (EPA 7061-L)	mg/L	ND	0.50	ND	.5	09/22/90	09/27/90	JB
Barium/TCLP (EPA 6010-L)	mg/L	ND	5	ND	5	09/22/90	09/26/90	JW
Cadmium/TCLP (EPA 6010-L)	mg/L	ND	0.05	ND	.05	09/22/90	09/26/90	JW
Chromium/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW
Lead/TCLP (EPA 6010-L)	mg/L	0.57	0.5	ND	.5	09/22/90	09/26/90	JW
Mercury/TCLP (EPA 7470)	mg/L	ND	0.02	ND	.02	09/22/90	09/27/90	JW
Selenium/TCLP (EPA 7741-L)	mg/L	ND	0.05	ND	.05	09/22/90	09/27/90	JB
Silver/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW

Laboratory Report

ENSECO CRL VENTURA
2810 BUNSEN AVENUE, UNIT A
VENTURA, CA 93003
ATTN: MR. LEO RAAB

Analysis No.: G-9026305-002
Date Sampled: 14-SEP-1990
Date Sample Rec'd: 20-SEP-1990
Sample Type: SOLID

Project: (02611715) BATELLE
Sample ID: (02611715-07) HPV-51C

METALS Prepared by EPA 3010 By NL
MERCURY Prepared by HG PREP By NL

Parameter	Units	Sample Result	Sample RL	Blank Result	Blank RL	Date Prepared	Date Analyzed	By
Arsenic/TCLP (EPA 7061-L)	mg/L	ND	0.50	ND	.5	09/22/90	09/27/90	JB
Barium/TCLP (EPA 6010-L)	mg/L	ND	5	ND	5	09/22/90	09/26/90	JW
Cadmium/TCLP (EPA 6010-L)	mg/L	ND	0.05	ND	.05	09/22/90	09/26/90	JW
Chromium/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW
Lead/TCLP (EPA 6010-L)	mg/L	1.1	0.5	ND	.5	09/22/90	09/26/90	JW
Mercury/TCLP (EPA 7470)	mg/L	ND	0.02	ND	.02	09/22/90	09/27/90	JW
Selenium/TCLP (EPA 7741-L)	mg/L	ND	0.05	ND	.05	09/22/90	09/27/90	JB
Silver/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW

Laboratory Report

ENSECO CRL VENTURA
2810 BUNSEN AVENUE, UNIT A
VENTURA, CA 93003
ATTN: MR. LEO RAAB

Analysis No.: G-9026305-003
Date Sampled: 14-SEP-1990
Date Sample Rec'd: 20-SEP-1990
Sample Type: SOLID

Project: (02611715) BATELLE
Sample ID: (02611715-14) HPV-69C

METALS Prepared by EPA 3010 By NL
MERCURY Prepared by HG PREP By NL

Parameter	Units	Sample Result	Sample RL	Blank Result	Blank RL	Date Prepared	Date Analyzed	By
Arsenic/TCLP (EPA 7061-L)	mg/L	ND	0.50	ND	.5	09/22/90	09/27/90	JB
Barium/TCLP (EPA 6010-L)	mg/L	ND	5	ND	5	09/22/90	09/26/90	JW
Cadmium/TCLP (EPA 6010-L)	mg/L	ND	0.05	ND	.05	09/22/90	09/26/90	JW
Chromium/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW
Lead/TCLP (EPA 6010-L)	mg/L	1.4	0.5	ND	.5	09/22/90	09/26/90	JW
Mercury/TCLP (EPA 7470)	mg/L	ND	0.02	ND	.02	09/22/90	09/27/90	JW
Selenium/TCLP (EPA 7741-L)	mg/L	ND	0.05	ND	.05	09/22/90	09/27/90	JB
Silver/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW

Laboratory Report

ENSECO CRL VENTURA
2810 BUNSEN AVENUE, UNIT A
VENTURA, CA 93003
ATTN: MR. LEO RAAB

Analysis No.: G-9026305-004
Date Sampled: 16-SEP-1990
Date Sample Rec'd: 20-SEP-1990
Sample Type: SOLID

Project: (02611715) BATELLE
Sample ID: (02611715-35) HPT-106C

METALS Prepared by EPA 3010 By NL
MERCURY Prepared by HG PREP By NL

Parameter	Units	Sample Result	Sample RL	Blank Result	Blank RL	Date Prepared	Date Analyzed	By
Arsenic/TCLP (EPA 7061-L)	mg/L	ND	0.50	ND	.5	09/22/90	09/27/90	JB
Barium/TCLP (EPA 6010-L)	mg/L	ND	5	ND	5	09/22/90	09/26/90	JW
Cadmium/TCLP (EPA 6010-L)	mg/L	0.13	0.05	ND	.05	09/22/90	09/26/90	JW
Chromium/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW
Lead/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW
Mercury/TCLP (EPA 7470)	mg/L	ND	0.02	ND	.02	09/22/90	09/27/90	JW
Selenium/TCLP (EPA 7741-L)	mg/L	ND	0.05	ND	.05	09/22/90	09/27/90	JB
Silver/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW

Laboratory Report

ENSECO CRL VENTURA
2810 BUNSEN AVENUE, UNIT A
VENTURA, CA 93003
ATTN: MR. LEO RAAB

Analysis No.: G-9026305-005
Date Sampled: 16-SEP-1990
Date Sample Rec'd: 20-SEP-1990
Sample Type: SOLID

Project: (02611715) BATELLE
Sample ID: (02611715-41) HPT-62C

METALS Prepared by EPA 3010 By NL
MERCURY Prepared by HG PREP By NL

Parameter	Units	Sample Result	Sample RL	Blank Result	Blank RL	Date Prepared	Date Analyzed	By
Arsenic/TCLP (EPA 7061-L)	mg/L	ND	0.50	ND	.5	09/22/90	09/27/90	JB
Barium/TCLP (EPA 6010-L)	mg/L	ND	5	ND	5	09/22/90	09/26/90	JW
Cadmium/TCLP (EPA 6010-L)	mg/L	0.08	0.05	ND	.05	09/22/90	09/26/90	JW
Chromium/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW
Lead/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW
Mercury/TCLP (EPA 7470)	mg/L	ND	0.02	ND	.02	09/22/90	09/27/90	JW
Selenium/TCLP (EPA 7741-L)	mg/L	ND	0.05	ND	.005	09/22/90	09/27/90	JB
Silver/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW

Laboratory Report

ENSECO CRL VENTURA
2810 BUNSEN AVENUE, UNIT A
VENTURA, CA 93003
ATTN: MR. LEO RAAB

Analysis No.: G-9026305-006
Date Sampled: 16-SEP-1990
Date Sample Rec'd: 20-SEP-1990
Sample Type: SOLID

Project: (02611715) BATELLE
Sample ID: (02611715-47) HPT-263C

METALS Prepared by EPA 3010 By NL
MERCURY Prepared by HG PREP By NL

Parameter	Units	Sample Result	Sample RL	Blank Result	Blank RL	Date Prepared	Date Analyzed	By
Arsenic/TCLP (EPA 7061-L)	mg/L	ND	0.50	ND	.5	09/22/90	09/27/90	JB
Barium/TCLP (EPA 6010-L)	mg/L	ND	5	ND	5	09/22/90	09/26/90	JW
Cadmium/TCLP (EPA 6010-L)	mg/L	0.10	0.05	ND	.05	09/22/90	09/26/90	JW
Chromium/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW
Lead/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW
Mercury/TCLP (EPA 7470)	mg/L	ND	0.02	ND	.02	09/22/90	09/27/90	JW
Selenium/TCLP (EPA 7741-L)	mg/L	ND	0.05	ND	.05	09/22/90	09/27/90	JB
Silver/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW

Laboratory Report

ENSECO CRL VENTURA
2810 BUNSEN AVENUE, UNIT A
VENTURA, CA 93003
ATTN: MR. LEO RAAB

Analysis No.: G-9026305-007
Date Sampled: 14-SEP-1990
Date Sample Rec'd: 20-SEP-1990
Sample Type: SOLID

Project: (02611715) BATELLE
Sample ID: (02611715-01) HPU-26C

METALS Prepared by EPA 3010 By NL
MERCURY Prepared by HG PREP By NL

Parameter	Units	Sample Result	Sample RL	Blank Result	Blank RL	Date Prepared	Date Analyzed	By
Arsenic/TCLP (EPA 7061-L)	mg/L	ND	0.50	ND	.5	09/22/90	09/27/90	JB
Barium/TCLP (EPA 6010-L)	mg/L	ND	5	ND	5	09/22/90	09/26/90	JW
Cadmium/TCLP (EPA 6010-L)	mg/L	ND	0.05	ND	.05	09/22/90	09/26/90	JW
Chromium/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW
Lead/TCLP (EPA 6010-L)	mg/L	1.0	0.5	ND	.5	09/22/90	09/26/90	JW
Mercury/TCLP (EPA 7470)	mg/L	ND	0.02	ND	.02	09/22/90	09/27/90	JW
Selenium/TCLP (EPA 7741-L)	mg/L	ND	0.05	ND	.05	09/22/90	09/27/90	JB
Silver/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW

Laboratory Report

ENSECO CRL VENTURA
2810 BUNSEN AVENUE, UNIT A
VENTURA, CA 93003
ATTN: MR. LEO RAAB

Analysis No.: G-9026305-008
Date Sampled: 14-SEP-1990
Date Sample Rec'd: 20-SEP-1990
Sample Type: SOLID

Project: (02611715) BATELLE
Sample ID: (02611715-12) HPU-29C

METALS Prepared by EPA 3010 By NL
MERCURY Prepared by HG PREP By NL

Parameter	Units	Sample Result	Sample RL	Blank Result	Blank RL	Date Prepared	Date Analyzed	By
Arsenic/TCLP (EPA 7061-L)	mg/L	ND	0.50	ND	.5	09/22/90	09/27/90	JB
Barium/TCLP (EPA 6010-L)	mg/L	ND	5	ND	5	09/22/90	09/26/90	JW
Cadmium/TCLP (EPA 6010-L)	mg/L	ND	0.05	ND	.05	09/22/90	09/26/90	JW
Chromium/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW
Lead/TCLP (EPA 6010-L)	mg/L	1.8	0.5	ND	.5	09/22/90	09/26/90	JW
Mercury/TCLP (EPA 7470)	mg/L	ND	0.02	ND	.02	09/22/90	09/27/90	JW
Selenium/TCLP (EPA 7741-L)	mg/L	ND	0.05	ND	.05	09/22/90	09/27/90	JB
Silver/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW

Laboratory Report

ENSECO CRL VENTURA
2810 BUNSEN AVENUE, UNIT A
VENTURA, CA 93003
ATTN: MR. LEO RAAB

Analysis No.: G-9026305-009
Date Sampled: 14-SEP-1990
Date Sample Rec'd: 20-SEP-1990
Sample Type: SOLID

Project: (02611715) BATELLE
Sample ID: (02611715-13) HPU-62C

METALS Prepared by EPA 3010 By NL
MERCURY Prepared by HG PREP By NL

Parameter	Units	Sample Result	Sample RL	Blank Result	Blank RL	Date Prepared	Date Analyzed	By
Arsenic/TCLP (EPA 7061-L)	mg/L	ND	0.50	ND	.5	09/22/90	09/27/90	JB
Barium/TCLP (EPA 6010-L)	mg/L	ND	5	ND	5	09/22/90	09/26/90	JW
Cadmium/TCLP (EPA 6010-L)	mg/L	0.077	0.05	ND	.05	09/22/90	09/26/90	JW
Chromium/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW
Lead/TCLP (EPA 6010-L)	mg/L	0.80	0.5	ND	.5	09/22/90	09/26/90	JW
Mercury/TCLP (EPA 7470)	mg/L	ND	0.02	ND	.02	09/22/90	09/27/90	JW
Selenium/TCLP (EPA 7741-L)	mg/L	ND	0.05	ND	.05	09/22/90	09/27/90	JB
Silver/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW

Laboratory Report

ENSECO CRL VENTURA
2810 BUNSEN AVENUE, UNIT A
VENTURA, CA 93003
ATTN: MR. LEO RAAB

Analysis No.: G-9026305-010
Date Sampled: 14-SEP-1990
Date Sample Rec'd: 20-SEP-1990
Sample Type: SOLID

Project: (02611715) BATELLE
Sample ID: (02611715-19) HPU-269C

METALS Prepared by EPA 3010 By NL
MERCURY Prepared by HG PREP By NL

Parameter	Units	Sample Result	Sample RL	Blank Result	Blank RL	Date Prepared	Date Analyzed	By
Arsenic/TCLP (EPA 7061-L)	mg/L	ND	0.50	ND	.5	09/22/90	09/27/90	JB
Barium/TCLP (EPA 6010-L)	mg/L	ND	5	ND	5	09/22/90	09/26/90	JW
Cadmium/TCLP (EPA 6010-L)	mg/L	ND	0.05	ND	.05	09/22/90	09/26/90	JW
Chromium/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW
Lead/TCLP (EPA 6010-L)	mg/L	1.1	0.5	ND	.5	09/22/90	09/26/90	JW
Mercury/TCLP (EPA 7470)	mg/L	ND	0.02	ND	.02	09/22/90	09/27/90	JW
Selenium/TCLP (EPA 7741-L)	mg/L	ND	0.05	ND	.05	09/22/90	09/27/90	JB
Silver/TCLP (EPA 6010-L)	mg/L	ND	0.5	ND	.5	09/22/90	09/26/90	JW

Laboratory Report

ENSECO CRL VENTURA
2810 BUNSEN AVENUE, UNIT A
VENTURA, CA 93003
ATTN: MR. LEO RAAB

Analysis No.: G-9026305-001/019
Date Sampled: 14-SEP-1990
16-SEP-1990
Date Sample Rec'd: 20-SEP-1990
Sample Type: SOLID

Project: (02611715) BATELLE

Matrix Spike/Matrix Spike Duplicate Report

Sample Number	Parameter (Method)	Units	Observed Concentration			Amt. Spiked	% Recovery			% RPD
			Sample	MS	MSD		MS	MSD	Avg.	
9026305-019	SULFIDE, REACTIVE (EPA 376.2)	mg/kg	ND	2.92	3.03	3.1	94	98	96	4
9026305-005	BARIUM (EPA 6010-L)	mg/L	ND	0.983	0.985	1.0	98	99	98	0
9026305-005	CADMIUM (EPA 6010-L)	mg/L	0.080	0.837	0.879	1.0	76	80	78	5
9026305-005	CHROMIUM (EPA 6010-L)	mg/L	ND	0.865	0.901	1.0	87	90	88	4
9026305-005	LEAD (EPA 6010-L)	mg/L	ND	0.842	0.882	1.0	84	88	86	5
9026305-005	SILVER (EPA 6010-L)	mg/L	ND	0.754	0.772	1.0	75	77	76	2
9026305-005	ARSENIC (EPA 7061-L)	mg/L	ND	0.94	0.96	1.0	94	96	95	2
9026305-001	CHROMIUM, HEXAVALENT/STLC (EPA 7196)	mg/L	ND	1.37	1.29	2.00	69	65	67	6
9026305-004	CHROMIUM, HEXAVALENT/TTLC (EPA 7196)	mg/kg	ND	1.98	1.98	2.0	99	99	99	0
9026305-003A	MERCURY (EPA 7470)	mg/L	ND	0.0017	0.0016	0.0020	85	80	83	6
9026305-005	SELENIUM (EPA 7741-L)	mg/L	ND	0.88	0.93	1.0	88	93	91	6

Laboratory Report

ENSECO CRL VENTURA
2810 BUNSEN AVENUE, UNIT A
VENTURA, CA 93003
ATTN: MR. LEO RAAB

Analysis No.: G-9026305-001/019
Date Sampled: 14-SEP-1990
16-SEP-1990
Date Sample Rec'd: 20-SEP-1990
Sample Type: SOLID

Project: (02611715) BATELLE

Laboratory Control Sample Report

QC Batch	Parameter (Method)	Amt. Spiked	Units	Avg. Spike Recov.	Acceptable Range	Rel. Pct. Diff.	Acceptable Range
L90274006	SULFIDE, REACTIVE (EPA 376.2)	1.0	mg/kg	92.	75-130	4.	25
L90272005	BARIUM (EPA 6010-L)	1.0	mg/L	99.	71-121	1.	20
L90272005	CADMIUM (EPA 6010-L)	1.0	mg/L	92.	73-119	0.	20
L90272005	CHROMIUM (EPA 6010-L)	1.0	mg/L	99.	71-123	3.	20
L90272005	LEAD (EPA 6010-L)	1.0	mg/L	96.	68-125	1.	20
L90272005	SILVER (EPA 6010-L)	1.0	mg/L	83.	70-123	0.	20
L90270042	ARSENIC (EPA 7061-L)	1.0	mg/L	95.	78-120	2.	20
L90275030	CHROMIUM, HEXAVALENT/ STLC (EPA 7196)	2.00	mg/L	97.	60-130	3.	40
L90275031	CHROMIUM, HEXAVALENT/ TTLC (EPA 7196)	2.0	mg/kg	97.	60-130	3.	40
L90270030	MERCURY (EPA 7470)	0.0020	mg/L	98.	51-130	5.	29
L90270032	SELENIUM (EPA 7741-L)	1.0	mg/L	85.	55-128	7.	27
L90284047	PH (EPA 9045)	9.183	units	100.	98-102	0.	1

Battelle

Columbus Laboratories

CHAIN OF CUSTODY RECORD

Form No. 002

Proj. No. G 8558-8301 Project Title HUNTERS POINT

SAMPLERS: (Signature)

D. Hendry / Tom Powell

DATE	TIME	SEQ. NO.	CART. NO.	SAMPLE I.D.	TCLP (8) metals	PH OF TCLP LIQUOR AFTER EXTRACTION	TCLP (17) metals plus Cr III	STLC (12) metals plus Cr III	PH OF STLC LIQUOR AFTER EXTRACTION	SAMPLE TYPE (V)	Container No.	Number of Containers	Remarks
14 SEP 90	1330			HPU-26 C	✓	X	✓	✓	X			1	
14 SEP 90	1440			HPU-133 C	✓	X	✓	✓	X			1	
14 SEP 90	1515			HPU-51 C	✓	X	✓	✓	X			1	
14 SEP 90	1330			HPU-29 C	✓	X	✓	✓	X			1	
14 SEP 90	1405			HPU-62 C	✓	X	✓	✓	X			1	
14 SEP 90	1230			HPU-69 C	✓	X	✓	✓	X			1	
14 SEP 90	1250			HPU-269 C	✓	X	✓	✓	X			1	

Relinquished by: (Signature) <i>D. Hendry</i>	Date/Time 17 SEP 90 0750		Received by: (Signature)	Relinquished by: (Signature)	Date/Time		Received by: (Signature)
Relinquished by: (Signature)	Date/Time		Received by: (Signature)	Relinquished by: (Signature)	Date/Time		Received by: (Signature)
Relinquished by: (Signature)	Date/Time		Received for Laboratory by: (Signature) <i>R. Phelan</i>	Date/Time 7/18/90 930		Remarks rec'd with custody seals intact	

Battelle

Columbus Laboratories

CHAIN OF CUSTODY RECORD

Form No. 003

Proj. No.

Project Title

G 8558-
8301

HUNTERS POINT

SAMPLERS: (Signature)

Doug. Headington / Tom Powell

DATE

TIME

SEQ.
NO.

CART.
NO.

SAMPLE I.D.

SAMPLE TYPE (✓)

Container No.

Number
of
Containers

Remarks

DATE	TIME	SEQ. NO.	CART. NO.	SAMPLE I.D.	TTLC (Pb+Cu)	STLC (Pb+Cu)	STLC PH OF LEACHATE	Reactive Sulfide PH OF REACTIVE SPENT SOLUTION	PH 1:1	Container No.	Number of Containers	Remarks
14 SEP 90	1815			HPT144 C	✓	✓	✓		✓		1	
16 SEP 90	1620			HPT 213 C	✓	✓	✓	✓	✓		1	
16 SEP 90	1530			HPT 83 C	✓	✓	✓		✓		1	
14 SEP 90	1700			HPT 172 C	✓	✓	✓		✓		1	
14 SEP 90	1800			HPT 158 C	✓	✓	✓	✓	✓		1	
16 SEP 90	1110			HPT 190 C	✓	✓	✓		✓		1	
16 SEP 90	1020			HPT 230 C	✓	✓	✓	✓	✓		1	
16 SEP 90	1555			HPT 250 C	✓	✓	✓	✓	✓		1	
16 SEP 90	1225			HPT 90 C	✓	✓	✓	✓	✓		1	
16 SEP 90	1100			HPT 261 C	✓	✓	✓	✓	✓		1	
16 SEP 90	925			HPT 216 C	✓	✓	✓	✓	✓		1	
14 SEP 90	1750			HPT 134 C	✓	✓	✓	✓	✓		1	
16 SEP 90	1315			HPT 88 C	✓	✓	✓		✓		1	
16 SEP 90	1620			HPT 388 C	✓	✓	✓		✓		1	
16 SEP 90	1555			HPT 361 C	✓	✓	✓	✓	✓		1	

Relinquished by: (Signature)

Date/Time

Received by: (Signature)

Relinquished by: (Signature)

Date/Time

Received by:
(Signature)

Relinquished by: (Signature)

Date/Time

Received by:
(Signature)

Relinquished by: (Signature)

Date/Time

Received by:
(Signature)

Relinquished by: (Signature)

Date/Time

Received for Laboratory by:
(Signature)

Date/Time

Remarks PH OF STLC, ~~STLC~~, Leachates
After extractions.
PH OF Reactive Sulfide
Spent Solutions. Page 2 of 3

R. Phelan

9-18-90 9:30

Proj. No.
G 8558-
8301

Project Title

HUNTERS POINT

SAMPLERS: (Signature)

SAMPLERS: (Signature) Drey Headington / Tom Powell

DATE _____

TIME

SAMPLE I.D.

SAMPLE TYPE (✓)

Container No.

Number
of
Containers

Remarks

16 SEP 90	1400	HPT 106 C
16 SEP 90	1205	HPT 62 C
16 SEP 90	1140	HPT 263 C

TTLC (17) netal
Plus Cr-DI

TLC (17) P18

LC PH OF
LEARNATE

CLP (8) metal

PH OR LEACHATE

/ / /

///

121 H2

Container No.	
---------------	--

Number	of
--------	----

Containers

2

Remarks

Relinquished by: (Signature)

Date/Time

Received by: (Signature)

Relinquished by: (Signature)

Date/Time

Received by:
(Signature)

Relinquished by: (Signature)

Date/Time

Received by:
(Signature)

Relinquished by: (Signature)

Date/Time

Received by:
(Signature)

Relinquished by: (Signature)

Date/Time

Received for Laboratory by:
(Signature) _____

Date/Time

Remarks PH OF STLC AND TCLP
Residates After Extractions.

ABB DATA



RESULTS OF CHEMICAL ANALYSIS
for NAVAL CIVIL ENGINEERING LAB./BATTELLE/HUNTERS POINT
Request for Services # 01048-01

SEMIVOLATILE ORGANICS

Client Sample I.D.: METHOD BLANK
Laboratory Sample I.D.: NA

Date Received: NA
Units: ug/kg

Analyte	Method	Result	Detect. Limit(*)	Date Analyzed	Dil. Factor
Phenol	EPA 8270	ND	330	10/16/90	1
bis(2-Chloroethyl)ether		ND	67		
2-Chlorophenol		ND	330		
1,3-Dichlorobenzene		ND	67		
1,4-Dichlorobenzene		ND	67		
Benzyl alcohol		ND	160		
1,2-Dichlorobenzene		ND	67		
2-Methylphenol		ND	160		
bis(2-Chloroisopropyl)ether		ND	67		
4-Methylphenol		ND	160		
N-Nitroso-di-n-propylamine		ND	67		
Hexachloroethane		ND	67		
Nitrobenzene		ND	67		
Isophorone		ND	67		
2-Nitrophenol		ND	660		
2,4-Dimethylphenol		ND	160		
Benzoic acid		ND	660		
bis(2-Chloroethoxy)methane		ND	67		
2,4-Dichlorophenol		ND	330		
1,2,4-Trichlorobenzene		ND	67		
Naphthalene		ND	67		
4-Chloroaniline		ND	660		
Hexachlorobutadiene		ND	160		
4-Chloro-3-methylphenol		ND	330		
2-Methylnaphthalene		ND	67		
Hexachlorocyclopentadiene		ND	160		
2,4,6-Trichlorophenol		ND	330		
2,4,5-Trichlorophenol		ND	330		
2-Chloronaphthalene		ND	67		
2-Nitroaniline		ND	67		
Dimethylphthalate		ND	330		
Acenaphthylene		ND	67		
3-Nitroaniline		ND	660		
Acenaphthene		ND	67		
2,4-Dinitrophenol		ND	660		

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".

ND - Not detected at the corrected detection
limit.

Approval by: *Ellen Jenkins*

8270.FRM

ABB Environmental Services, Inc.

10615



RESULTS OF CHEMICAL ANALYSIS
for NAVAL CIVIL ENGINEERING LAB./BATTELLE/HUNTERS POINT
Request for Services # 01048-01

SEMIVOLATILE ORGANICS

Client Sample I.D.: METHOD BLANK
Laboratory Sample I.D.: NA

Date Received: NA
Units: ug/kg

Analyte	Method	Result	Detect. Limit(*)	Date Analyzed	Dil. Factor
4-Nitrophenol	BPA 8270	ND	660	10/16/90	1
Dibenzofuran		ND	67		
2,4-Dinitrotoluene		ND	67		
2,6-Dinitrotoluene		ND	67		
Diethylphthalate		ND	160		
4-Chlorophenyl-phenylether		ND	67		
Fluorene		ND	67		
4-Nitroaniline		ND	660		
4,6-Dinitro-2-methylphenol		ND	660		
N-Nitrosodiphenylamine		ND	67		
4-Bromophenyl-phenylether		ND	67		
Hexachlorobenzene		ND	67		
Pentachlorophenol		ND	660		
Phenanthrene		ND	67		
Anthracene		ND	67		
Di-n-butylphthalate		ND	160		
Fluoranthene		ND	67		
Pyrene		ND	67		
Butylbenzylphthalate		ND	160		
3,3'-Dichlorobenzidine		ND	1700		
Benzo(a)anthracene		ND	67		
bis(2-Ethylhexyl)phthalate		ND	67		
Chrysene		ND	67		
Di-n-octyl phthalate		ND	67		
Benzo(b)fluoranthene		ND	67		
Benzo(k)fluoranthene		ND	67		
Benzo(a)pyrene		ND	67		
Indeno(1,2,3-cd)pyrene		ND	67		
Dibenz(a,h)anthracene		ND	67		
Benzo(g,h,i)perylene		ND	67		

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".

ND - Not detected at the corrected detection
limit.

Approved by: Ellen Jenkins

8270.FRM

ABB Environmental Services, Inc.

2 of 15



RESULTS OF CHEMICAL ANALYSIS
for NAVAL CIVIL ENGINEERING LAB./BATTELLE/HUNTERS POINT
Request for Services # 01048-01

SEMIVOLATILE ORGANICS

Client Sample I.D.: HPT - 241 B
Laboratory Sample I.D.: 90007359

Date Received: 09/14/90
Units: ug/kg

Analyte	Method	Result	Detect. Limit(*)	Date Analyzed	Dil. Factor
Phenol	EPA 8270	1900	330	10/16/90	1
bis(2-Chloroethyl)ether		ND	67		
2-Chlorophenol		ND	330		
1,3-Dichlorobenzene		ND	67		
1,4-Dichlorobenzene		ND	67		
Benzyl alcohol		ND	160		
1,2-Dichlorobenzene		ND	67		
2-Methylphenol		ND	160		
bis(2-Chloroisopropyl)ether		ND	67		
4-Methylphenol		ND	160		
N-Nitroso-di-n-propylamine		ND	67		
Hexachloroethane		ND	67		
Nitrobenzene		ND	67		
Isophorone		ND	67		
2-Nitrophenol		ND	660		
2,4-Dimethylphenol		ND	160		
Benzoic acid		ND	660		
bis(2-Chloroethoxy)methane		ND	67		
2,4-Dichlorophenol		ND	330		
1,2,4-Trichlorobenzene		ND	67		
Naphthalene		89	67		
4-Chloroaniline		ND	660		
Hexachlorobutadiene		ND	160		
4-Chloro-3-methylphenol		ND	330		
2-Methylnaphthalene		ND	67		
Hexachlorocyclopentadiene		ND	160		
2,4,6-Trichlorophenol		ND	330		
2,4,5-Trichlorophenol		ND	330		
2-Chloronaphthalene		ND	67		
2-Nitroaniline		ND	67		
Dimethylphthalate		ND	330		
Acenaphthylene		ND	67		
3-Nitroaniline		ND	660		
Acenaphthene		190	67		
2,4-Dinitrophenol		ND	660		

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".

ND - Not detected at the corrected detection
limit.

Approval by:

Ellen Jenkins

8270.FRM

ABB Environmental Services, Inc.

3 of 15



RESULTS OF CHEMICAL ANALYSIS
for NAVAL CIVIL ENGINEERING LAB./BATTELLE/HUNTERS POINT
Request for Services # 01048-01

SEMIVOLATILE ORGANICS

Client Sample I.D.: HPT - 241 B
Laboratory Sample I.D.: 90007359

Date Received: 09/14/90
Units: ug/kg

Analyte	Method	Result	Detect. Limit(*)	Date Analyzed	Dil. Factor
4-Nitrophenol	EPA 8270	ND	660	10/16/90	1
Dibenzofuran		ND	67		
2,4-Dinitrotoluene		ND	67		
2,6-Dinitrotoluene		ND	67		
Diethylphthalate		ND	160		
4-Chlorophenyl-phenylether		ND	67		
Fluorene		200	67		
4-Nitroaniline		ND	660		
4,6-Dinitro-2-methylphenol		ND	660		
N-Nitrosodiphenylamine		ND	67		
4-Bromophenyl-phenylether		ND	67		
Hexachlorobenzene		ND	67		
Pentachlorophenol		ND	660		
Phenanthrene		2200	67		
Anthracene		470	67		
Di-n-butylphthalate		ND	160		
Fluoranthene		2700	67		
Pyrene		2300	67		
Butylbenzylphthalate		ND	160		
3,3'-Dichlorobenzidine		ND	1700		
Benzo(a)anthracene		1100	67		
bis(2-Ethylhexyl)phthalate		8500	67		
Chrysene		1400	67		
Di-n-octyl phthalate		ND	67		
Benzo(b)fluoranthene		ND	67		
Benzo(k)fluoranthene		2900	67		
Benzo(a)pyrene		1200	67		
Indeno(1,2,3-cd)pyrene		ND	67		
Dibenz(a,h)anthracene		ND	67		
Benzo(g,h,i)perylene		ND	67		

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".

ND - Not detected at the corrected detection
limit.

Approved by:

Ellen Jenkins

8270.FRM

ABB Environmental Services, Inc.

4 of 15



RESULTS OF CHEMICAL ANALYSIS
for NAVAL CIVIL ENGINEERING LAB./BATTELLE/HUNTERS POINT
Request for Services # 01048-01

SEMIVOLATILE ORGANICS

Client Sample I.D.: HPU - 144 B
Laboratory Sample I.D.: 90007361

Date Received: 09/14/90
Units: ug/kg

Analyte	Method	Result	Detect. Limit(*)	Date Analyzed	Dil. Factor
Phenol	EPA 8270	ND	330	10/16/90	1
bis(2-Chloroethyl)ether		ND	67		
2-Chlorophenol		ND	330		
1,3-Dichlorobenzene		ND	67		
1,4-Dichlorobenzene		ND	67		
Benzyl alcohol		ND	160		
1,2-Dichlorobenzene		ND	67		
2-Methylphenol		ND	160		
bis(2-Chloroisopropyl)ether		ND	67		
4-Methylphenol		ND	160		
N-Nitroso-di-n-propylamine		ND	67		
Hexachloroethane		ND	67		
Nitrobenzene		ND	67		
Isophorone		ND	67		
2-Nitrophenol		ND	660		
2,4-Dimethylphenol		ND	160		
Benzoic acid		ND	660		
bis(2-Chloroethoxy)methane		ND	67		
2,4-Dichlorophenol		ND	330		
1,2,4-Trichlorobenzene		ND	67		
Naphthalene		68	67		
4-Chloroaniline		ND	660		
Hexachlorobutadiene		ND	160		
4-Chloro-3-methylphenol		ND	330		
2-Methylnaphthalene		ND	67		
Hexachlorocyclopentadiene		ND	160		
2,4,6-Trichlorophenol		ND	330		
2,4,5-Trichlorophenol		ND	330		
2-Chloronaphthalene		ND	67		
2-Nitroaniline		ND	67		
Dimethylphthalate		ND	330		
Acenaphthylene		ND	67		
3-Nitroaniline		ND	660		
Acenaphthene		200	67		
2,4-Dinitrophenol		ND	660		

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".

ND - Not detected at the corrected detection
limit.

Approval by: Ellen Jenkins

8270.FRM

ABB Environmental Services, Inc.

5 of 15



RESULTS OF CHEMICAL ANALYSIS
for NAVAL CIVIL ENGINEERING LAB./BATTELLE/HUNTERS POINT
Request for Services # 01048-01

SEMIVOLATILE ORGANICS

Client Sample I.D.: HPU - 144 B
Laboratory Sample I.D.: 90007361

Date Received: 09/14/90
Units: ug/kg

Analyte	Method	Result	Detect. Limit(*)	Date Analyzed	Dil. Factor
4-Nitrophenol	BPA 8270	ND	660	10/16/90	1
Dibenzofuran		ND	67		
2,4-Dinitrotoluene		ND	67		
2,6-Dinitrotoluene		ND	67		
Diethylphthalate		ND	160		
4-Chlorophenyl-phenylether		ND	67		
Fluorene		230	67		
4-Nitroaniline		ND	660		
4,6-Dinitro-2-methylphenol		ND	660		
N-Nitrosodiphenylamine		ND	67		
4-Bromophenyl-phenylether		ND	67		
Hexachlorobenzene		ND	67		
Pentachlorophenol		ND	660		
Phenanthrene		2100	67		
Anthracene		540	67		
Di-n-butylphthalate		ND	160		
Fluoranthene		2500	67		
Pyrene		2100	67		
Butylbenzylphthalate		ND	160		
3,3'-Dichlorobenzidine		ND	1700		
Benzo(a)anthracene		810	67		
bis(2-Ethylhexyl)phthalate		810	67		
Chrysene		910	67		
Di-n-octyl phthalate		ND	67		
Benzo(b)fluoranthene		ND	67		
Benzo(k)fluoranthene		2200	67		
Benzo(a)pyrene		950	67		
Indeno(1,2,3-cd)pyrene		ND	67		
Dibenx(a,h)anthracene		ND	67		
Benzo(g,h,i)perylene		ND	67		

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".

ND - Not detected at the corrected detection
limit.

Approved by:

Ellen Jenkins

8270.FRM

ABB Environmental Services, Inc.



RESULTS OF CHEMICAL ANALYSIS
for NAVAL CIVIL ENGINEERING LAB./BATTELLE / HUNTERS POINT
Request for Services # 01048-01

Volatile Organics

Client Sample I.D.: HPT - 241 A
Laboratory Sample I.D.: 90007358
Date Sampled: 09/13/90

Date Received: 09/14/90
Units: ug/kg

Analyte	Method	Result	Detect. Limit(*)	Date Analysed	Dil. Factor
Chloromethane	EPA 8240	ND	2.0	09/17/90	1
Bromomethane		ND	2.0	09/17/90	1
Vinyl chloride		ND	2.0	09/17/90	1
Chloroethane		ND	2.0	09/17/90	1
Methylene chloride		39.	2.0	09/17/90	1
Acetone		410	2.0	09/17/90	1
Carbon disulfide		ND	2.0	09/17/90	1
1,1-Dichloroethene		ND	2.0	09/17/90	1
1,1-Dichloroethane		ND	2.0	09/17/90	1
1,2-Dichloroethene (total)		ND	2.0	09/17/90	1
Chloroform		ND	2.0	09/17/90	1
1,2-Dichloroethane		ND	2.0	09/17/90	1
2-Butanone		69.	10.	09/17/90	1
1,1,1-Trichloroethane		ND	2.0	09/17/90	1
Carbon tetrachloride		ND	2.0	09/17/90	1
Vinyl acetate		ND	2.0	09/17/90	1
Bromodichloromethane		ND	2.0	09/17/90	1
1,2-Dichloropropane		ND	2.0	09/17/90	1
cis-1,3-Dichloropropene		ND	2.0	09/17/90	1
Trichloroethene		5.6	2.0	09/17/90	1
Dibromochloromethane		ND	2.0	09/17/90	1
1,1,2-Trichloroethane		ND	2.0	09/17/90	1
Benzene		ND	2.0	09/17/90	1
trans-1,3-Dichloropropene		ND	2.0	09/17/90	1
Bromoform		ND	2.0	09/17/90	1
4-Methyl-2-pentanone		ND	2.0	09/17/90	1
2-Hexanone		2.5	2.0	09/17/90	1
Tetrachloroethene		ND	2.0	09/17/90	1
1,1,2,2-Tetrachloroethane		ND	2.0	09/17/90	1
Toluene		7.9	2.0	09/17/90	1
Chlorobenzene		ND	2.0	09/17/90	1

ND - Not detected at the indicated detection limit.

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".

Approved by: Ellen Jenkins

ABB Environmental Services, Inc.



RESULTS OF CHEMICAL ANALYSIS
for NAVAL CIVIL ENGINEERING LAB./BATTELLE / HUNTERS POINT
Request for Services # 01048-01

Volatile Organics

Client Sample I.D.: HPT - 241 A
Laboratory Sample I.D.: 90007358
Date Sampled: 09/13/90

Date Received: 09/14/90
Units: ug/kg

Analyte	Method	Result	Detect. Limit(*)	Date Analyzed	Dil. Factor
Ethylbenzene	EPA 8240	4.1	2.0	09/17/90	1
Styrene		ND	2.0	09/17/90	1
Xylene (total)		32.	2.0	09/17/90	1
1,4-Dichlorobenzene		ND	2.0	09/17/90	1
1,3-Dichlorobenzene		ND	2.0	09/17/90	1
1,2-Dichlorobenzene		2.8	2.0	09/17/90	1
Trichlorofluoromethane		ND	2.0	09/17/90	1

ND - Not detected at the indicated detection limit.

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".

Approved by: *Ellen Jenkins*

ABB Environmental Services, Inc.



RESULTS OF CHEMICAL ANALYSIS
for NAVAL CIVIL ENGINEERING LAB./BATTELLE / HUNTERS POINT
Request for Services # 01048-01

Volatile Organics

Client Sample I.D.: EPU - 144 A
Laboratory Sample I.D.: 90007360
Date Sampled: 09/13/90

Date Received: 09/14/90
Units: ug/kg

Analyte	Method	Result	Detect. Limit(*)	Date Analyzed	Dil. Factor
Chloromethane	EPA 8240	ND	2.0	09/17/90	1
Bromomethane		ND	2.0	09/17/90	1
Vinyl chloride		ND	2.0	09/17/90	1
Chloroethane		ND	2.0	09/17/90	1
Methylene chloride		14.	2.0	09/17/90	1
Acetone		20.	2.0	09/17/90	1
Carbon disulfide		ND	2.0	09/17/90	1
1,1-Dichloroethane		ND	2.0	09/17/90	1
1,1-Dichloroethane		ND	2.0	09/17/90	1
1,2-Dichloroethane (total)		ND	2.0	09/17/90	1
Chloroform		ND	2.0	09/17/90	1
1,2-Dichloroethane		ND	2.0	09/17/90	1
2-Butanone		ND	10.	09/17/90	1
1,1,1-Trichloroethane		ND	2.0	09/17/90	1
Carbon tetrachloride		ND	2.0	09/17/90	1
Vinyl acetate		ND	2.0	09/17/90	1
Bromodichloromethane		ND	2.0	09/17/90	1
1,2-Dichloropropane		ND	2.0	09/17/90	1
cis-1,3-Dichloropropene		ND	2.0	09/17/90	1
Trichloroethane		ND	2.0	09/17/90	1
Dibromochloromethane		ND	2.0	09/17/90	1
1,1,2-Trichloroethane		ND	2.0	09/17/90	1
Benzene		ND	2.0	09/17/90	1
trans-1,3-Dichloropropene		ND	2.0	09/17/90	1
Bromoform		ND	2.0	09/17/90	1
4-Methyl-2-pentanone		ND	2.0	09/17/90	1
2-Hexanone		ND	2.0	09/17/90	1
Tetrachloroethene		ND	2.0	09/17/90	1
1,1,2,2-Tetrachloroethane		ND	2.0	09/17/90	1
Toluene		ND	2.0	09/17/90	1
Chlorobenzene		ND	2.0	09/17/90	1

ND - Not detected at the indicated detection limit.

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".

Approved by: Ellen Jenkins

ABB Environmental Services, Inc.

90815



RESULTS OF CHEMICAL ANALYSIS
for NAVAL CIVIL ENGINEERING LAB./BATTELLE / HUNTERS POINT
Request for Services # 01048-01

Volatile Organics

Client Sample I.D.: HPU - 144 A
Laboratory Sample I.D.: 90007360
Date Sampled: 09/13/90

Date Received: 09/14/90
Units: ug/kg

Analyte	Method	Result	Detect. Limit(*)	Date Analyzed	Dil. Factor
Ethylbenzene	EPA 8240	ND	2.0	09/17/90	1
Styrene		ND	2.0	09/17/90	1
Xylene (total)		ND	2.0	09/17/90	1
1,4-Dichlorobenzene		ND	2.0	09/17/90	1
1,3-Dichlorobenzene		ND	2.0	09/17/90	1
1,2-Dichlorobenzene		ND	2.0	09/17/90	1
Trichlorofluoromethane		ND	2.0	09/17/90	1

ND - Not detected at the indicated detection limit.

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".

Approved by: Ellen Jenkins

ABB Environmental Services, Inc.



RESULTS OF CHEMICAL ANALYSIS
for NAVAL CIVIL ENGINEERING LAB./BATTELLE / HUNTERS POINT
Request for Services # 01048-01

Volatile Organics

Client Sample I.D.: METHOD BLANK
Laboratory Sample I.D.: NA
Date Sampled: NA

Date Received: NA
Units: ug/kg

Analyte	Method	Result	Detect. Limit(*)	Date Analyzed	Dil. Factor
Chloromethane	EPA 8240	ND	2.0	09/17/90	1
Bromomethane		ND	2.0	09/17/90	1
Vinyl chloride		ND	2.0	09/17/90	1
Chloroethane		ND	2.0	09/17/90	1
Methylene chloride		3.1	2.0	09/17/90	1
Acetone		4.6	2.0	09/17/90	1
Carbon disulfide		ND	2.0	09/17/90	1
1,1-Dichloroethene		ND	2.0	09/17/90	1
1,1-Dichloroethane		ND	2.0	09/17/90	1
1,2-Dichloroethene (total)		ND	2.0	09/17/90	1
Chloroform		ND	2.0	09/17/90	1
1,2-Dichloroethane		ND	2.0	09/17/90	1
2-Butanone		ND	10.	09/17/90	1
1,1,1-Trichloroethane		ND	2.0	09/17/90	1
Carbon tetrachloride		ND	2.0	09/17/90	1
Vinyl acetate		ND	2.0	09/17/90	1
Bromodichloromethane		ND	2.0	09/17/90	1
1,2-Dichloropropane		ND	2.0	09/17/90	1
cis-1,3-Dichloropropene		ND	2.0	09/17/90	1
Trichloroethene		ND	2.0	09/17/90	1
Dibromochloromethane		ND	2.0	09/17/90	1
1,1,2-Trichloroethane		ND	2.0	09/17/90	1
Benzene		ND	2.0	09/17/90	1
trans-1,3-Dichloropropene		ND	2.0	09/17/90	1
Bromoform		ND	2.0	09/17/90	1
4-Methyl-2-pentanone		ND	2.0	09/17/90	1
2-Hexanone		ND	2.0	09/17/90	1
Tetrachloroethene		ND	2.0	09/17/90	1
1,1,2,2-Tetrachloroethane		ND	2.0	09/17/90	1
Toluene		ND	2.0	09/17/90	1
Chlorobenzene		ND	2.0	09/17/90	1

ND - Not detected at the indicated detection limit.

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".

Approved by:

Ellen Jenkins

ABB Environmental Services, Inc.

11 0815



RESULTS OF CHEMICAL ANALYSIS
for NAVAL CIVIL ENGINEERING LAB./BATTELLE / HUNTERS POINT
Request for Services # 01048-01

Volatile Organics

Client Sample I.D.: METHOD BLANK
Laboratory Sample I.D.: NA
Date Sampled: NA

Date Received: NA
Units: ug/kg

Analyte	Method	Result	Detect. Limit(*)	Date Analyzed	Dil. Factor
Ethylbenzene	EPA 8240	ND	2.0	09/17/90	1
Styrene		ND	2.0	09/17/90	1
Xylene (total)		ND	2.0	09/17/90	1
1,4-Dichlorobenzene		ND	2.0	09/17/90	1
1,3-Dichlorobenzene		ND	2.0	09/17/90	1
1,2-Dichlorobenzene		ND	2.0	09/17/90	1
Trichlorofluoromethane		ND	2.0	09/17/90	1

ND - Not detected at the indicated detection limit.

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".

Approved by: Ellen Jenkins

ABB Environmental Services, Inc.

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12 of 15



RESULTS OF CHEMICAL ANALYSIS
for NAVAL CIVIL ENGINEERING LAB./BATTELLE / HUNTERS POINT
Request for Services # 01048-01

Organochlorine pesticides and PCB's

Client Sample I.D.: METHOD BLANK
Laboratory Sample I.D.: NA
Date Sampled: NA

Date Received: NA
Units: ug/kg

Analyte	Method	Result	Detect. Limit(*)	Date Analyzed	Dil. Factor
alpha-BHC	EPA 8080	ND	8.0	10/02/90	1
beta-BHC		ND	8.0	10/02/90	1
delta-BHC		ND	8.0	10/02/90	1
gamma-BHC (Lindane)		ND	8.0	10/02/90	1
Heptachlor		ND	8.0	10/02/90	1
Aldrin		ND	8.0	10/02/90	1
Heptachlor epoxide		ND	8.0	10/02/90	1
Endosulfan I		ND	8.0	10/02/90	1
Dieldrin		ND	16.	10/02/90	1
4,4'-DDE		ND	16.	10/02/90	1
Endrin		ND	16.	10/02/90	1
Endosulfan II		ND	16.	10/02/90	1
4,4'-DDD		ND	16.	10/02/90	1
Endosulfan sulfate		ND	16.	10/02/90	1
4,4'-DDT		ND	16.	10/02/90	1
Methoxychlor		ND	80.	10/02/90	1
Endrin Ketone		ND	16.	10/02/90	1
alpha-chlordane		ND	80.	10/02/90	1
gamma-Chlordane		ND	80.	10/02/90	1
Toxaphene		ND	160	10/02/90	1
Aroclor 1016		ND	80.	10/02/90	1
Aroclor 1221		ND	80.	10/02/90	1
Aroclor 1232		ND	80.	10/02/90	1
Aroclor 1242		ND	80.	10/02/90	1
Aroclor 1248		ND	80.	10/02/90	1
Aroclor 1254		ND	160	10/02/90	1
Aroclor 1260		ND	160	10/02/90	1

ND - Not detected at the indicated detection limit.

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".

Approved by: Ellen Jenkins

ABB Environmental Services, Inc.

13 of 15



RESULTS OF CHEMICAL ANALYSIS
for NAVAL CIVIL ENGINEERING LAB./DATTELLE / HUNTERS POINT
Request for Services # 01048-01

Organochlorine pesticides and PCB's

Client Sample I.D.: HPT - 241 B
Laboratory Sample I.D.: 90007359
Date Sampled: 09/13/90

Date Received: 09/14/90
Units: ug/kg

Analyte	Method	Result	Detect. Limit(*)	Date Analyzed	Dil. Factor
alpha-BHC	BPA 8080	ND	8.0	10/02/90	1
beta-BHC		ND	8.0	10/02/90	1
delta-BHC		ND	8.0	10/02/90	1
gamma-BHC (Lindane)		ND	8.0	10/02/90	1
Heptachlor		ND	8.0	10/02/90	1
Aldrin		ND	8.0	10/02/90	1
Heptachlor epoxide		ND	8.0	10/02/90	1
Endosulfan I		ND	8.0	10/02/90	1
Dieldrin		ND	16.	10/02/90	1
4,4'-DDE		ND	16.	10/02/90	1
Endrin		ND	16.	10/02/90	1
Endosulfan II		ND	16.	10/02/90	1
4,4'-DDD		ND	16.	10/02/90	1
Endosulfan sulfate		ND	16.	10/02/90	1
4,4'-DDT		ND	16.	10/02/90	1
Methoxychlor		ND	80.	10/02/90	1
Endrin Ketone		ND	16.	10/02/90	1
alpha-chlordane		ND	80.	10/02/90	1
gamma-Chlordane		ND	80.	10/02/90	1
Toxaphene		ND	160	10/02/90	1
Aroclor 1016		ND	80.	10/02/90	1
Aroclor 1221		ND	80.	10/02/90	1
Aroclor 1232		ND	80.	10/02/90	1
Aroclor 1242		ND	80.	10/02/90	1
Aroclor 1248		ND	80.	10/02/90	1
Aroclor 1254		1200	160	10/02/90	1
Aroclor 1260		710	160	10/02/90	1

ND - Not detected at the indicated detection limit.

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".

Approved by: Ellen Jenkins

ABB Environmental Services, Inc.

14 of 15



RESULTS OF CHEMICAL ANALYSIS
for NAVAL CIVIL ENGINEERING LAB./BATTELLE / HUNTERS POINT
Request for Services # 01048-01

Organochlorine pesticides and PCB's

Client Sample I.D.: HPU - 144 B
Laboratory Sample I.D.: 90007361
Date Sampled: 09/13/90

Date Received: 09/14/90
Units: ug/kg

Analyte	Method	Result	Detect. Limit(*)	Date Analyzed	Dil. Factor
alpha-BHC	EPA 8080	ND	8.0	10/02/90	1
beta-BHC		ND	8.0	10/02/90	1
delta-BHC		ND	8.0	10/02/90	1
gamma-BHC (Lindane)		ND	8.0	10/02/90	1
Heptachlor		ND	8.0	10/02/90	1
Aldrin		ND	8.0	10/02/90	1
Heptachlor epoxide		ND	8.0	10/02/90	1
Endosulfan I		ND	8.0	10/02/90	1
Dieldrin		ND	16.	10/02/90	1
4,4'-DDE		ND	16.	10/02/90	1
Endrin		ND	16.	10/02/90	1
Endosulfan II		ND	16.	10/02/90	1
4,4'-DDD		ND	16.	10/02/90	1
Endosulfan sulfate		ND	16.	10/02/90	1
4,4'-DDT		ND	16.	10/02/90	1
Methoxychlor		ND	80.	10/02/90	1
Endrin Ketone		ND	16.	10/02/90	1
alpha-chlordane		ND	80.	10/02/90	1
gamma-Chlordane		ND	80.	10/02/90	1
Toxaphene		ND	160	10/02/90	1
Aroclor 1016		ND	80.	10/02/90	1
Aroclor 1221		ND	80.	10/02/90	1
Aroclor 1232		ND	80.	10/02/90	1
Aroclor 1242		ND	80.	10/02/90	1
Aroclor 1248		ND	80.	10/02/90	1
Aroclor 1254		ND	160	10/02/90	1
Aroclor 1260		ND	160	10/02/90	1

ND - Not detected at the indicated detection limit.

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".

Approved by: *Ellen Jenkins*

ABB Environmental Services, Inc.

ORGANO-TIN DATA

82

To: Gregory L. Headington, Senior Technician, Environmental Technology,
Battelle

From: Lora Kear, Marine Environment Branch (Code 522), Naval Ocean Systems
Center

Dear Mr. Headington:

Here are results of TBT analysis of the 3 samples of blasting grit from Naval Station, Treasure Island, Hunters Point Annex. I am also sending a copy of the current SOP. Subset I was analyzed per the SOP. I noticed that the water layer was retained around the grains, providing a barrier between the grains and the dichloromethane (this has never been a problem with other sediments I've worked with). Because of this, I ran another set (II) without adding HCl. After discussing the water barrier problem with Scott Magrum at David Taylor Research Center, I ran a Soxhlet extraction for 24 hours (subset III), again without HCl.

If you have any questions regarding these results, feel free to contact me at (619) 553-2761.



Lora Kear

Post-It™ brand fax transmittal memo 7671		# of pages • 3
To GREGORY HEADINGTON	From LORA KEAR	
Co. BATTELLE	Co. NOSC	
Dept. ENVIRONMENTAL TECH.	Phone # (619) 553-2761	
Fax # (619) 424-5263	Fax # (619) 553-6305	

ENCLOSURE 1

RESULTS OF TBT ANALYSIS OF THE 3 SAMPLES OF
BLASTING GRIT

THIS ENCLOSURE IS NOT AVAILABLE.

EXTENSIVE RESEARCH WAS PERFORMED BY NAVFAC
SOUTHWEST RECORDS OFFICE TO LOCATE THE MISSING
ENCLOSURE. THIS PAGE HAS BEEN INSERTED AS A
PLACEHOLDER AND WILL BE REPLACED SHOULD THE
MISSING ITEM BE LOCATED.

FOR ADDITIONAL INFORMATION, CONTACT:

DIANE C. SILVA, RECORDS MANAGER
NAVAL FACILITIES ENGINEERING COMMAND, SOUTHWEST
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132

TELEPHONE: (619) 532-3676

E-MAIL: diane.silva@navy.mil

STANDARD OPERATING PROCEDURES for SEDIMENT and TISSUE ANALYSIS
(GC/FPD) for BUTYLTIN CHLORIDES

PROCEDURE:

1. Store samples immediately after arrival in a freezer at approximately -6°C . Label and tare aluminum weighing pans and 50 ml polypropylene centrifuge tubes. After thawing, air dry overnight an adequate amount of sediment; homogenize tissues immediately after thawing. Weigh out in the centrifuge tubes 3 g of air-dried sediment or 10 g of homogenized tissue to the nearest hundredth of a gram. Determine dry/wet ratios by placing an aliquot of homogenized tissue or sediment into tared aluminum weigh pans and drying overnight at $>100^{\circ}\text{C}$.

2. Add 10 ml of 50% v/v (in water) hydrochloric acid to each sample. Vortex the samples long enough to mix the samples adequately, and allow them to sit for 1/2 hour before adding 20 ml of methylene chloride to each tube. Vortex the samples again and place on a reciprocating shaker for three hours. Centrifuge at 4000 rpm for 10 minutes, after which, remove a 2 ml aliquot of the methylene chloride layer for derivitization and dry under air at 35°C .

3. Add 10 μl of triphenyltin bromide (prepared in-house) stock solution to each sample as an internal standard (sample [TPT] approx. 1.5 $\mu\text{g}/\text{ml}$). Reconstitute the extracts in 2 ml hexane and add 250 μl of 2.0 M n-hexylmagnesium bromide. Vortex the samples for 15 seconds. Allow to sit for 15 minutes, then destroy the remaining Grignard reagent by adding 4 ml of 0.4 N sulfuric acid; vortex for 1 minute. Centrifuge at 4000 rpm for 10 minutes. Remove the organic layer and pass through SUPELCO florisil (1 gm) columns (Prepare the columns by rinsing twice with 3 ml hexane; after the sample has passed through the column, rinse twice with 2 ml hexane). Dry the cleaned extracts under air at 35°C and reconstitute in 200 μl hexane for subsequent GC/FPD analysis.

4. Prepare calibration standards (0, 10, 25, 50, and 100 μl) monthly. Generate the 5-point calibration curve daily to quantitate the samples on a spreadsheet program and account for day-to-day changes of the instrument.

Reference: Stallard, et al, 1989. Applied Organometallic Chemistry (3):105-114.

Enclosure (2)